Welding Engineer

JUNE, 1961
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WELDERS • ELECTRODES

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VOL. 46—No. 6

Welding Engineer

The magazine of joining and severing of materials

This is welding: June, 1961

Positioning & Automation in this issue

It's position that counts! 37
Eliminate all your positioning equipment and your welding costs will jump 50%. Reposition from overhead to downhand welding and your welding speed will increase approximately 280%. These are just a few of the reasons why positioning is emphasized so much.
★ (For a reprint of this article, circle 249 on Welding Info-Aid Card.)

Should you switch to automatic arc welding? 41
In today's competitive market, quality requirements are high and labor costs are rising. Automatic arc welding, however, can save you both time and money, as well as maintain high quality — if you select the proper welding process for the particular job.
★ (For a reprint of this article, circle 250 on Welding Info-Aid Card.)

Cover photo . . . (courtesy Bethlehem Steel Co.) shows a heavy-plate machine for curing tires being built at The McNeil Machine and Engineering Co., Akron, Ohio

Automatic welding — from transistors to forgings 44
Less manpower, more horsepower — this is the theme of these case histories illustrating how automation was adapted to seven semiautomatic welding processes.

Will push-button welding replace pipeline weldors? 46
Automation has been slow coming to the pipeline industry. Now, automated systems for joining large diameter steel pipe in the field have been announced. Editor **F. T. Tancula** reports on these welders, which are being hailed as "revolutionary developments."

Space age spurs resistance welding innovation 54
Ultra-thin materials can now be joined to thick plates with sound welds using a resistance welding method developed by a west coast aeronautical firm. In light of space age requirements, this system takes on added importance.

Also in this issue:

Special positioning/automation new products 49
Now — one welder for six semiautomatic processes 50
List of positioning, automatic equipment manufacturers 52
AWS Welding Show attendance sets new record 56
WE celebrates 45th anniversary with awards luncheon 58
Nuclear ship has welded demineralizer 60

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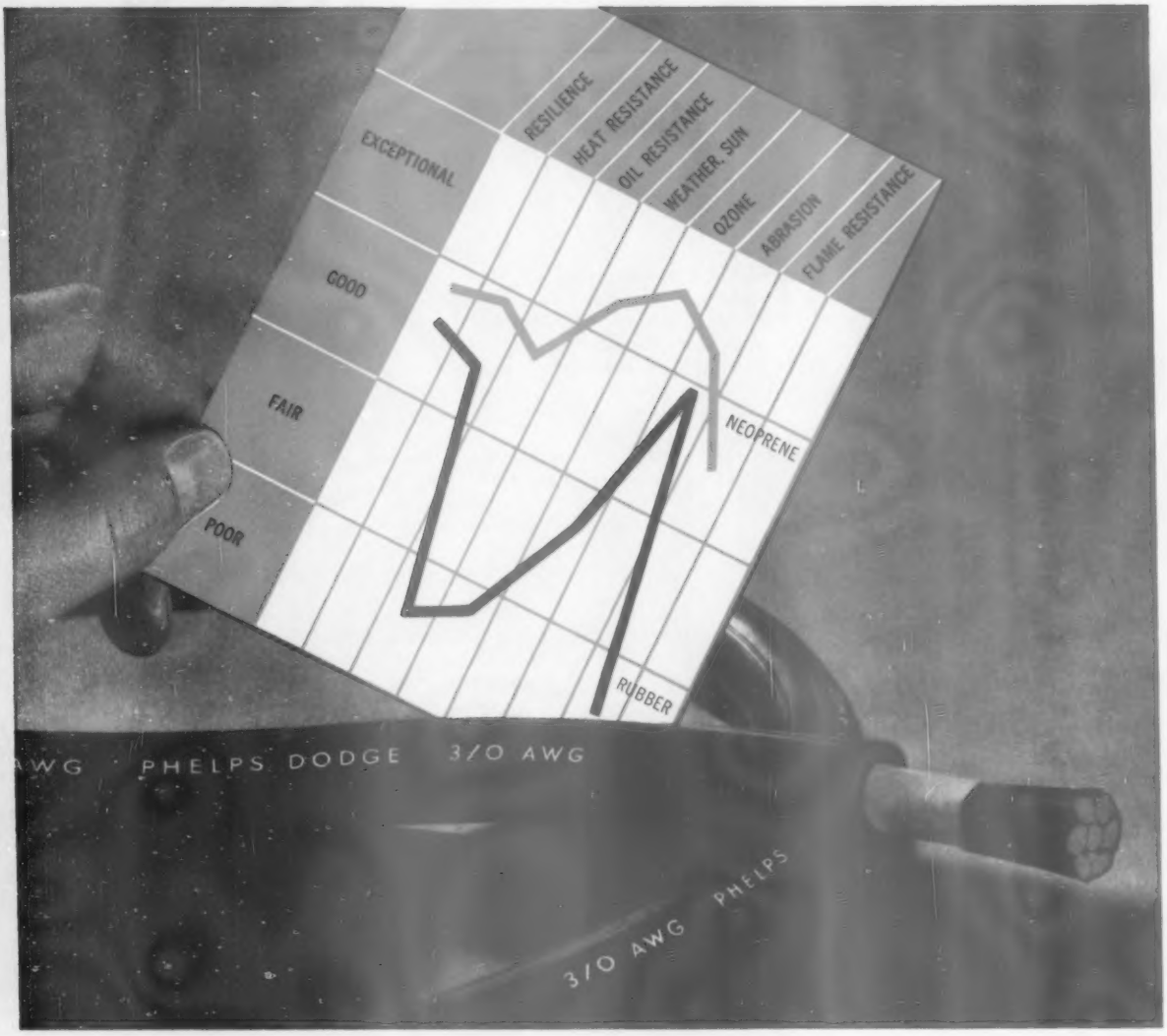

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MINE TO MARKET

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Welding Engineer

America's pioneer publication which, combined with The Acetylene Journal, has been devoted to the interest of the welding and allied industries since 1898

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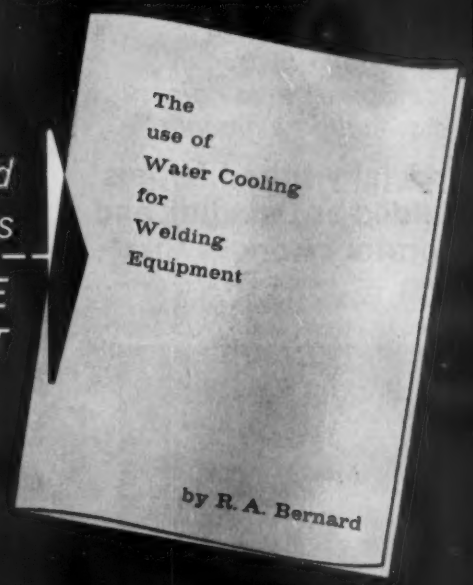

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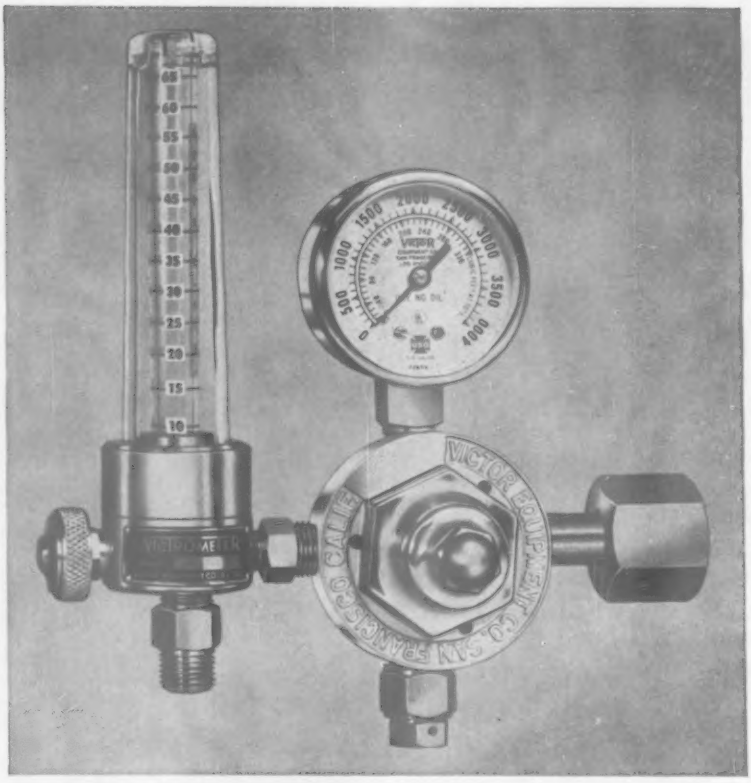

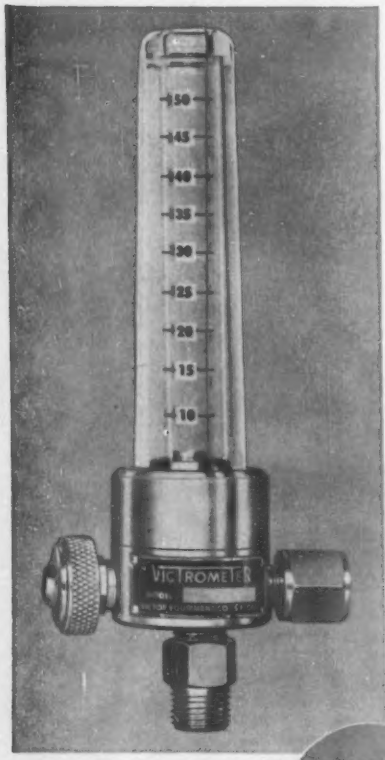

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June Headlines

AT the recent International Acetylene Association convention, John A. Hill (center, left), president of Air Reduction Co., Inc., New York City, offers his congratulations to Elmer Smith (center, right) who received the James Turner Morehead Medal for 1960. L. L. McBurney (left) and Eugene Easterly (right) joined in giving congratulations.

Smith gets IAA medal; Andrew elected president

Highlights of the recent two-day convention of the International Acetylene Association convention were the awarding of the James Turner Morehead Medal for 1960 to Elmer Smith and the election of C. G. Andrew as president for 1961-1962.

Smith is founder and honorary board chairman of Smith Welding Equipment (now Tescom) Corp. Andrew is an Air Reduction Sales Co. vice president.

Other officers elected were T. P. Turchan, American Cyanamid Co., New York City, vice president; L. G. Matthews, Linde Co., New York City, secretary; and Joseph Gulyas, Shawinigan Products Corp., New York City, treasurer.

Speakers at the presentation ceremony included L. L. McBurney, Tescom Corp. (see pp. 17 & 73), and Eugene Easterly, Union Carbide International Co., a division of Union Carbide Corp., New York City.

McBurney and Easterly are both past presidents of IAA.

Ohio State University to give X-ray course

The Ohio State University Department of Welding Engineering will present a summer conference course on x-ray and radioisotope nondestructive test techniques from Sept. 18-22.

The course will provide advanced training and laboratory experience in fundamental principles, equipment and techniques, capabilities and limitations, and interpretation of indications of penetrating radiation tests.

For further information, contact Dr. Robert C. McMaster, Dept. of Welding Engineering, The Ohio State University, 190 W. 19th Ave., Columbus 10, Ohio.

Kinzel will present ASTM Gillett Lecture

Augustus B. Kinzel, vice president of research for Union Carbide Corp., New York City, will present the annual Gillett Memorial Lecture at the 64th Annual Meeting of the American Society for Testing Materials.

The lecture will be given on June 27 at Chalfonte-Haddon Hall, Atlantic City, where the meeting is being held.

Kinzel's lecture will be "Specifications?" He has given many of the honorary memorial lectures in metallurgy and is the recipient of several awards including the IAA's Morehead Medal.

Army holds metals symposium

ATTENDING a recent 3-day light metals symposium at Fort Belvoir, Va., were (left to right) Robert Ridout, Kaiser Aluminum & Chemical Corp.; J. W. Hood, Aluminum Co. of America; E. V. Blackum, Alcoa; Howard Adkins, Kaiser; W. H. Baer, U. S. Army Engineer Research and Development Laboratories; C. J. Walton, Alcoa; J. G. Sutton, Alcoa; Col. J. D. Cole; Col. John H. Kerkering; H. Gilmore, Kaiser; G. R. Darrow, Reynolds Metals Co.; and Paul Brandt, Reynolds.

COMING EVENTS

JUNE 8-9: First Western Conference, NEMA, Biltmore Hotel, Los Angeles.

JUNE 12-23: Summer Conference Course, Fundamentals of Welding Engineering, The Ohio State University, Columbus, Ohio.

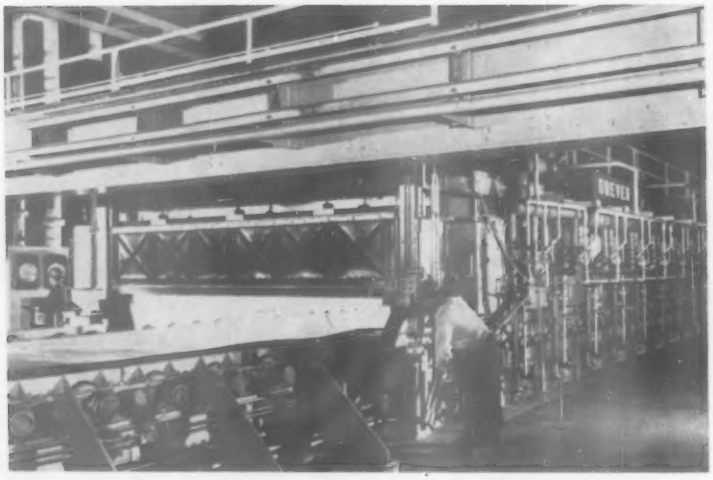
JULY 4-7: 27th Annual Meeting, The National Society of Professional Engineers, Olympic Hotel, Seattle, Wash.

JULY 18-20: Western Plant Maintenance and Engineering Show & Conference, Pan Pacific Auditorium, Los Angeles.

JULY 21-23: Eastern Regional Meeting, AIRPS, The Schino Inn, Chicopee, Mass.

SEPT. 12-14: 3rd Annual Southeastern Maintenance and Engineering Show, Greensboro War Memorial, Greensboro, N. C.

SEPT. 18-22: Summer Conference Course on X-Ray and Radioisotope Nondestructive Test Techniques, The Ohio State University, Columbus, Ohio.



ALLOY steel plate enters the hardening furnace in the second continuous quenching and tempering line at U. S. Steel's Homestead District Works.

Welded steel bars speed completion of building

A new reinforced concrete construction method employing welded steel reinforcement bars has hastened completion of the La-Salle-Jackson Building in Chicago.

The method reduces the mass in the lower floor columns, normally associated with reinforced concrete structures, by using special high tensile strength alloy steel for the vertical reinforcing bars.

The 2½-in.-diameter 25-ft-long bars are welded end-to-end rather than tied. Sixteen bars are used in each of the building's columns.

U.S. Steel expands steel plate heat-treating

With the installation of a second continuous quenching and tempering line at its district works, Homestead, Pa., U. S. Steel has assembled what may be the most complete and flexible steel plate heat treating equipment in the steel industry.

With this and other installations in the 160-in. and 100-in. mills, Homestead can treat plates from 1/10-in. thick to 6-in. thick and heavier.

AEC re-establishes source material regulations

The Atomic Energy Commission is amending its licensing regulations to provide for the re-establishment of a previous exemption for certain rare earth materials containing thorium and uranium.

The Commission has found that possession and use of uranium and thorium, in the United States is not of significance to the common defense and security and can be used without unreasonable hazard to life or property.

Glove distributors hold meeting, appoint officers

Albert Pransky of David L. Pransky & Sons, Philadelphia, was elected president of the National Association of Industrial Glove Distributors at their recent annual meeting.

During the meeting, a report was presented including a first draft of revised work glove standards which the Association is working on.

Welding firms offered sale-leaseback plan

A new plan, by which welding companies can sell their existing plant and equipment and immediately lease it back for terms of 3 to 12 years, is being offered by Nationwide Leasing Co., Chicago.

The plan is designed for firms with an over-large investment in fixed assets which hampers growth because of tight working capital.

(*For more news, turn to page* 68)

British visit Eutectic

REPRESENTATIVES from Great Britain were among 50 European delegates to the International Institute of Welding who were guests last month at Eutectic Welding Alloys Corp., Flushing, N. Y. From left are S. Melya Reisser; Mrs. Franz Koenigsberger; Joseph F. Quaas, Eutectic's vice president of research and production; Franz Konigsberger; and Maurice M. Birkhead.

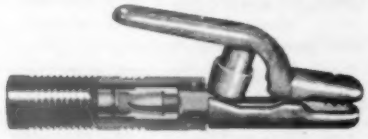
Jackson ST Holders

for trouble-free connections

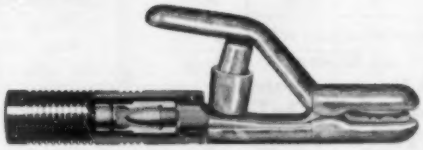
These copper alloy quality Jackson electrode holders have a permanent-type cable connection device good for the life of the cable. It grips the cable jacket as well as the cable, sealing out moisture and dirt. The jacket can't slip back, the strands won't flex and break. The 'stinger end' of the holder can be replaced repeatedly without remaking the connection.

These ST holders are attached to the cable in a simple mechanical way, but the result is an almost fused connection having excellent conductivity.

Get the utmost in conductivity, ease of connection, and long life. Get lower holder costs when buying ST holder stinger end replacements. Get a Jackson Sealed Tight holder in your hands soon and you'll *see* why they're better.



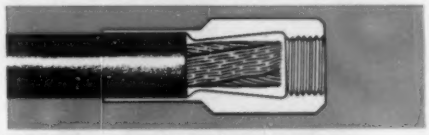
Model ST-3, copper alloy holder for electrodes through ¼" dia. Rated for 300 amps.



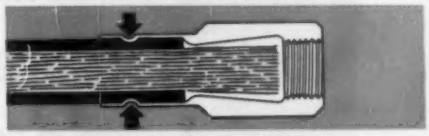
Model ST-5 copper alloy holder for electrodes through ⅜" dia. Rated for 500 amps.

■ *Strip back the cable jacket—*

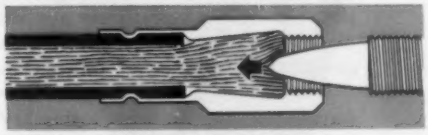
■ *Slide on the connection nut—*



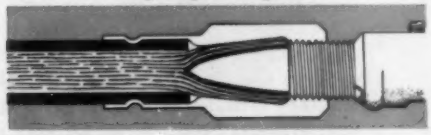
■ *Seal nut with crimping tool—*



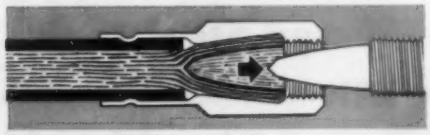
■ *Push holder stud into strands—*



■ *Wrench tightly into place—*



■ *Holder end may be replaced—*



■ *Connection assembly stays put!*

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Letters

Income tax editorial

Your editorial in the March issue of WELDING ENGINEER (*Uncle Sam deserves a pay cut*) is to be commended. It is indeed unfortunate that the American people cannot be aroused from the complacent state they have been in since 1933. Keep up the good work!

Robert A. Hay
Reynolds Metals Co.
Richmond, Va.

This is a rather belated commendation of your March editorial. We like this editorial for two reasons:

1. We believe limiting income tax would stimulate business and cause the Federal Government to be more careful in its spending.
2. We're happy to see a publisher urging businessmen to take action in governmental matters.

More power to you.

George C. McNutt
Geo. C. McNutt Advertising
Oakland, Calif.

Thermit welding

Our company rebuilds large castings for firms all over the nation. Most of our work is castings on roadbuilding equipment. We have been welding cast iron for over 25 years.

Recently we have been looking into the possibilities of the thermit welding process.

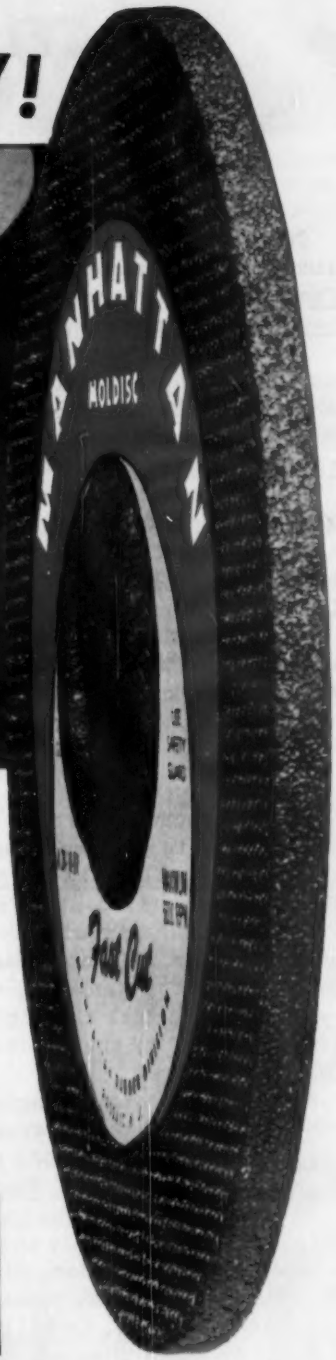
We would like to find where we can purchase materials for thermit welding and possibly more information about this process.

We certainly appreciate any help you can give us.

Dwain Swick
Swick-Guth Co.
McPherson, Kansas

(We would suggest that you get in touch with Thermex Metallurgical, Inc., Lakehurst, N.J. — Ed.)

A *Fast Cut* To SAVE MONEY!



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- get *more* work done *faster* than any other wheel of its type

STANDARD STOCK SIZES SPECIFICATION A24-Q8-BR							
DIA.	7"	7"	7"	DIA.	9"	9"	9"
THK.	1/8"	3/16"	1/4"	THK.	1/8"	3/16"	1/4"
HOLE	7/8"	7/8"	7/8"	HOLE	7/8"	7/8"	7/8"

Try The New MANHATTAN *FAST CUT* MOLDISC—

and *SAVE MONEY* on Your Next Job!

RM-1068

ENGINEERED RUBBER PRODUCTS . . . MORE USE PER DOLLAR

RM

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION • PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

For more facts Circle No. 158 on Welding Info-Aid Card

DATELINE: *Washington*

Congressmen agree with President Kennedy that tax incentives are needed to spur increased investment by business and industry. But many tax-wise legislators feel that the President's proposals, relating to tax reform, are too much of a hodge-podge, too complicated in some respects and too restrictive in others.

The President proposed tax revisions that would give $1.7 billion a year in tax savings for corporations, business proprietors, farmers and any self-employed who buy new income-producing equipment or tools, or build new plants or offices. But only those with astute tax accountants and lawyers could take full advantage of the new provisions.

Congressmen lean more toward the ideas of Rep. Wright Patman (Dem.-Tex.) and Sen. John Sparkman (Dem.-Ala.), repective chairmen of the Small Business Committees in the House and Senate, whose legislation provides for simple deductions of up to $30,000 or 20% of the amount spent on capital expenditures (whichever is the lesser) each year.

No one knows, of course, just what may come out of Congress, but it seems likely that the final tax-spur bill may resemble the frequently-introduced bills of Messrs. Sparkman and Patman more than the relief suggested by the President.

* * *

JFK's proposals to raise tax revenue (to make up for what may be lost otherwise) are in trouble in some areas. Congressmen ridicule the idea of allowing businessmen to deduct legally only $30 a day for travel. It might cost a salesman more than that to hire a helicopter for one side trip on an afternoon.

If JFK were restricted to $30 a day travel money, one legislator pointed out privately, he couldn't even fly to Andrews Air Force base and back to greet one foreign visitor without going beyond the bounds.

Legislators feel that it is unrealistic to set a ceiling on business expenditures, if these actually are incurred, without considering the purpose of the expenditures.

Treasury Secretary Douglas Dillon told the House Committee on Ways and Means that the Kennedy tax program of this year is a forerunner to a broad tax reform program which JFK intends to send to Capitol Hill next year. He indicated it will propose net tax relief, from the most modest to the highest income, rather than mere reallocation of the same tax burdens from one group to another.

Congress isn't likely to tinker with the 52% corporation tax and excise taxes on such items as liquor, cigarettes, telephone service, autos and parts, and the President did not recommend changes in those areas for this year. Next year may be quite different, if Dillon's promises can be taken at face value.

Rep. Don Short (Rep.-N.D.) has introduced legislation to set up a Commission on Federal Taxation "to go into all aspects of tax reforms and adjustments which would have a stimulating effect on our economy."

* * *

Ready access to information on 2,298 university business and economic research projects, either recently completed or now in progress, has been made available in "A Survey of University Business and Economic Research Projects" by the Small

Business Administration. Copies are available for study, free, at all SBA field offices, or may be purchased for $3.50 from the U. S. Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The compilation of faculty and doctoral research projects includes reports from 320 institutions which replied to questionnaires sent to 1,738 colleges and universities known to have business schools or departments of economics.

It was prepared for SBA by the Bureau of Business Research, University of Texas, and the information is intended to indicate the availability of current reference material, to prevent research duplication in fields where adequate work has been or is being carried out, and to indicate fields where research is necessary or desirable.

* * *

The hearings of the Automation Subcommittee of the House Committee on Education and Labor have come and gone (with more hearings possible later in various areas) with one result: Labor Secretary Arthur Goldberg has set up a new Office of Automation and Manpower in the Department of Labor.

The new director, Dr. Seymour L. Wolfbein, stated that "the President and the Secretary of Labor are determined that the Government shall be geared to meet the challenges of automation and the manpower problems which flow out of the changes.

"I view my new powers, such as they are, as a means by which the Department of Labor, through this office, first, can enhance the work of existing, operating bureaus which have to do with studies of automation and its impact on people; and second, pull together all the forces and facilities which can be used to concentrate on this problem and to find valid solutions for phases and facets of it."

He strongly emphasized that the Government is dependent upon cooperation from industry and labor unions, which are expected to put into effect whatever findings and recommendations the new office might make, after joint conferences.

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A New High in Versatility... A New Low in Price!

PORTABLE 180c WELDER

- **VERSATILE**—for use in school, farm, small shop or contractor on the move . . . for welding, brazing, soldering, heating.
- **LOW COST**—low, low initial cost...low operating and maintenance cost.
- **PORTABLE**—only 68 lbs. total weight...truly hand portable.
- **HIGH OUTPUT**—180 amps full output...78 O.C.V....75% power factor . . . six conveniently located heat taps from 60 through 180 amps.
- **COMPACT**—only 21¾" x 14¼" x 10" in size.
- **EMERSON-ENGINEERED TO LAST**—quality constructed . . . backed by famous Emerson Electric guarantee . . . carries U.L., CSA, REA approval—NEMA rated.

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8100 FLORISSANT • ST. LOUIS 36, MO.

A Complete Line for Most Welding Needs

Between passes

we interview Eisler

What does the resistance-welding industry need today?

More automation, more individual design and less copying, says Dr. Charles Eisler, founder of Eisler Engineering Co., Inc., Newark.

In a recent exclusive interview with WELDING ENGINEER, the 77-year-old industry pioneer presented some of his opinions on the current state of the industry.

Today, the resistance welder manufacturer seems more concerned with making a sale than with producing new and useful machinery, Eisler stated. Years ago, when resistance welding was in its infancy, innovation and improvement of a machine was a prime consideration. Now "there is too much copying of what the other fellow is doing."

And buyers have contributed to this condition, he said, by playing one manufacturer against the other, sometimes quoting fictitious prices to bring a manufacturer's price down. Too often, a company falls for this deception in its eagerness to get the business.

A past president of RWMA, Eisler further stated that, besides this required originality in machine design, automation held still another solution for the manufacturer. In his recent autobiography, "The Million Dollar Bend," he wrote: "Automation is a must for the American manufacturer to stay in business. Foreign competition is too keen, and the only way the American manufacturer will be able to compete in foreign markets is by automation."

Since 1912, Eisler has made resistance spot welders for use in production of incandescent lamps and radio tubes. His is credited with saving the independent incandescent lamp makers from extinction through his legals battles with the "cartel" (as he calls the large, industry-dominating lamp manufacturers of 35 years ago).

Arriving in the United States from Budapest in 1904, Eisler quickly found a job as a toolmaker at Westinghouse's East Pittsburgh plant. In 1912 he returned to Hungary for a visit which lasted two years. During that time, he worked for a lamp maker for whom he built his first machines for producing the lamps. It was this early work and a published article which later won him the patent suits brought by the "cartel."

Returning to the U. S. in 1914, he went to work for Westinghouse Lamp Co., Bloomfield, N. J., where, using his experience acquired overseas, he built the first automatic filament gap coil-winder machine in the U. S.

Loss of a $10 punctuality and attendance bonus because he was away from the plant on official business, plus lack of recognition for his work, caused Eisler to move to another job in 1919. In five and half years, he rose to chief engineer and had designed in whole or in part some 75 machines.

After an ill-fated start with a lamp maker in Brooklyn, Eisler founded Eisler Engineering in 1920. In the next 30 years, he built more than 100,000 spot welders for radio tubes and incandescent lamp production.

He stopped counting in 1950.

In 1958, he retired as president of the company, which is now headed by his son, Charles, Jr.

opportunity

Cooperation between major corporations and small businesses is not lacking — despite anguished howls to the contrary that emanate from some of our social planners in Washington.

Striking evidence was the recent procurement symposium held in Chicago by General Electric Co. It was the largest industry-sponsored meeting of its kind since G-E pioneered the idea two years ago in conjunction with the federal Small Business Administration. G-E invited more than 2,000 small business representatives to attend the meeting, in which specific information was presented on the 1961 sub-contract opportunities available with the firm's Flight Propulsion Division. The division will let $300 million in subcontracts this year.

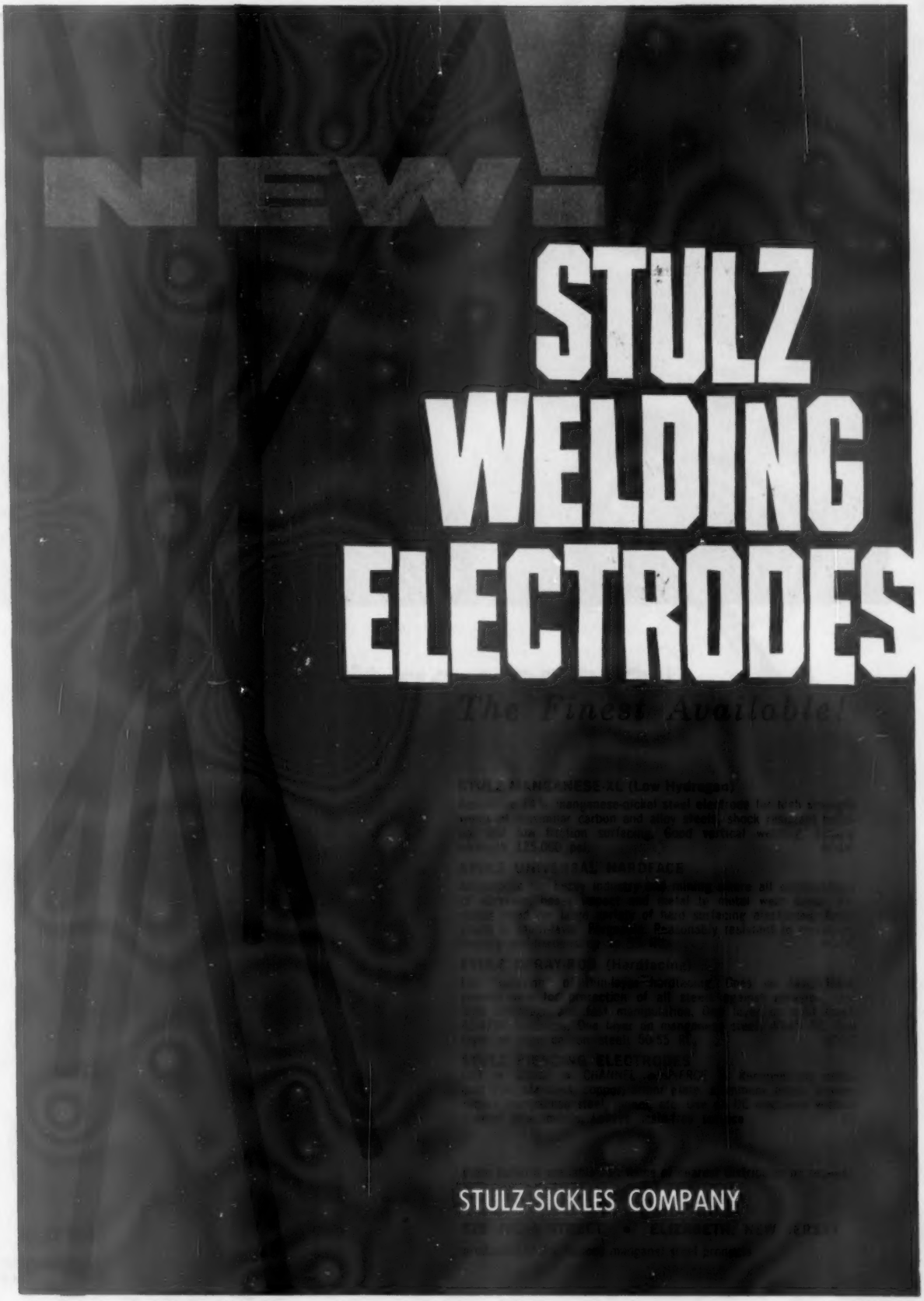
Small manufacturers from eight midwestern states were shown a display of more than 700 jet engine parts. The parts are representative of items currently purchased to support jet engine production at the division's plants in Cincinnati and Lynn, Mass.

John E. Horne, head of the SBA, expressed hope that "this meeting will offer an excellent opportunity for increased employment in Chicago and the surrounding midwestern cities . . . This initiative by G-E is a fine example of a major corporation cooperating with small enterprise."

promises, promises . . .

We shouldn't make them if we can't keep them.

In our April issue, we initiated the first article of a series on the major metals vying for an increased share of the growing cryogenic market. The second article — on 5083 aluminum — was promised for the next issue. But because of the press of other news features and other editorial commitments, this second part of the series will now appear in July. Watch for it.



For more facts Circle No. 160 on Welding Info-Aid Card

It's easy on the welder
It's flexible . . it's tough

Yes, Belden Welding Cable is "easy on the welder." It's engineered and manufactured to be extremely pliable, limp and flexible. Result: more production . . better quality . . lower costs.

And Belden Welding Cable is rugged . . rough and ready for the most severe conditions of abrasion, impact, as well as exposure to heat, cold, and oil.

Belden has a welding cable engineered for every possible welding requirement . . Oil Tempered Rubber Jacketed . . Neoprene Jacketed . . HVF Vinyl Plastic Jacketed . . Whip Lead, Super-flexible and Neoprene Jacketed . . Neocote colors for identification . . Rubber Jacketed Welder Supply Cords.

ORDER FROM YOUR WELDING SUPPLY DISTRIBUTOR

Belden Welding Cable comes in many ready-to-use package lengths.

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one wire source for everything electrical and electronic

magnet wire • lead wire • power supply cords • cord sets • portable cordage • electronic wire • control cables • automotive replacement wire and cable • aircraft wire

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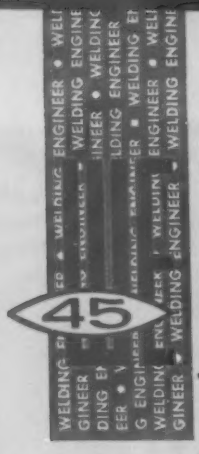


Your June, 1961

Weld World

As WE went to press, these were the industry's latest developments:

. . Peterson welding and brazing fluxes will now be marketed by J. M. Ragle Industries, Kansas City, Mo., which purchased the ____ business from Howe Sound Co. The latter acquired the flux line when it bought out Peterson Machine Tool, Inc., Merriam, Kan., early last year and made it a part of Sperry Products Co., Danbury, Conn.

. . Confirming reports first published here in March, at least one producer has cut prices on aluminum welding wire. Cuts range from 18 to 35 cents per pound.

. . Tescom Corp. is the new corporate name for Smith Welding Equipment Corp., Minneapolis. The latter, along with the recently activated Fluid Systems Division, becomes a division of Tescom. The new name was coined from The Elmer Smith Co. of Minnesota, honoring the founder, who is now honorary board chairman. L. L. McBurney moves up from the presidency to board chairman, while Jack E. Smith, former executive vice president, succeeds to the presidency.

. . Federal Machine and Welder Co., Warren, Ohio, has been completely merged with its parent firm, The McKay Machine Co., Youngstown, Ohio, and is now the Federal-Warco Division of McKay. A new expansion program announced by McKay includes improvements at the Warren plant and at Berkeley-Davis, Inc., subsidiary in Danville, Ill.

. . Five Alaskan firms — Alaska Chemical Corp., Anchorage Oxygen Co., Alaska Fire Equipment, Inc., Alaska Welding Supplies, Inc. and Alaska Hospital and Safety Supply — have been purchased by Industrial Air Products Co., Portland, Ore. Price was not announced.

. . As expected, copper prices were raised — twice, a cent per pound each time. As WE went to press, the price was 31 cents per pound.

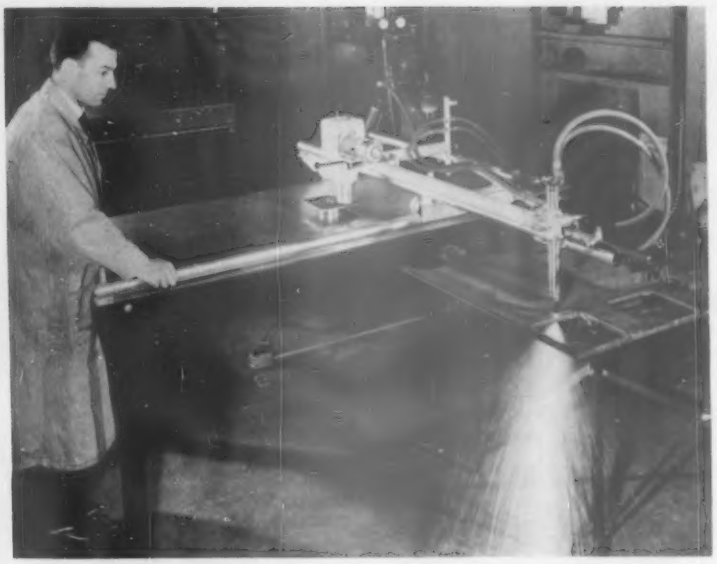
. . Aluminum up to 1 3/4 in. thick has been welded by the electron-beam process by Sciaky Bros, Inc., Chicago. It reportedly is the thickest joined by the process so far.

. . Jones & Laughlin Steel Corp. has been licensed by United States Steel Corp. to manufacture and sell products of Cor-Ten, a high-strength, low alloy steel.

. . Rolled structural shapes in T-1 and T-1 type A alloy steels, 9% nickel steel and HY-80 armour steel are now available from U. S. Steel Corp.

For more information, fold out Welding Info-Aid card on page 81 and circle appropriate numbers as you read.

NEW PRODUCTS for you



Flame-cutting unit makes 50-in. longitudinal, 30-in. transverse cuts

Low-cost oxycutting machine makes longitudinal, transverse cuts up to 50 and 30 in. respectively. Unit will produce compass-guided circles with 2⅜-in. to 153¾-in. radii. Type RM1 handles automatic production work from steel templates, square or bevel-edge straight line cutting, hand-guide cutting. **National Cylinder Gas Div.**

Circle No. 1 on Info-Aid Card.

Electrode joins, builds up austenitic maganese steel

Nickel manganese steel electrode has all-mineral coating designed for austenitic manganese steel buildup and/or bonding. Electrode will join nickel manganese to 1045 carbon steels, low-alloy steels and will join nickel manganese steels. Electrode features all position, multiple pass, high deposition, high strength, high ductility. Deposited hardness ranges from 75 to 85 Rockwell B Scale, but work-hardens to 45 Rockwell C Scale. **Rexarc, Inc.**

Circle No. 2 on Info-Aid Card.

Wire feed unit holds 2½ times greater supply

Wire feed unit for semi-automatic open arc hardfacing provides 2½ times wire supply of normal coil type machine. Provides 125 lb of continuous welding wire to cut down time for wire changeover. **Alloy Rods Co.**

Circle No. 3 on Info-Aid Card.

Loaded electrode oven reaches 215 F in 30 minutes

Loaded with 50 lb of steel electrodes, Hotbox reaches operating 215 F temperature in a little over 30 minutes. Oven has been tested under temperature change from below zero to 120 F with perfect operation. Constructed of cold-rolled steel. Outer liner is 14 gage, inner liner 16 gage. Corrosion-resistant heating element is 200-watt 117-volt unit rated at 1.7 amp. Average annual operation is about 5,300 hrs. When operating temperature reached, thermostat cycles heating element on and off about four times an hour. **W Corp.**

Circle No. 4 on Info-Aid Card.

Welding magnifier aids wearers of bifocals

Welding magnifier is designed for use in helmet windows for weldors who wear bifocals. Fits behind regular helmet filter lens. Made of precision ground and polished opthalmic glass and securely mounted in a rugged plastic frame. Eight focal powers provided. **Sellstrom Mfg. Co.**

Circle No. 5 on Info-Aid Card.

Silver brazing flux has unlimited shelf life

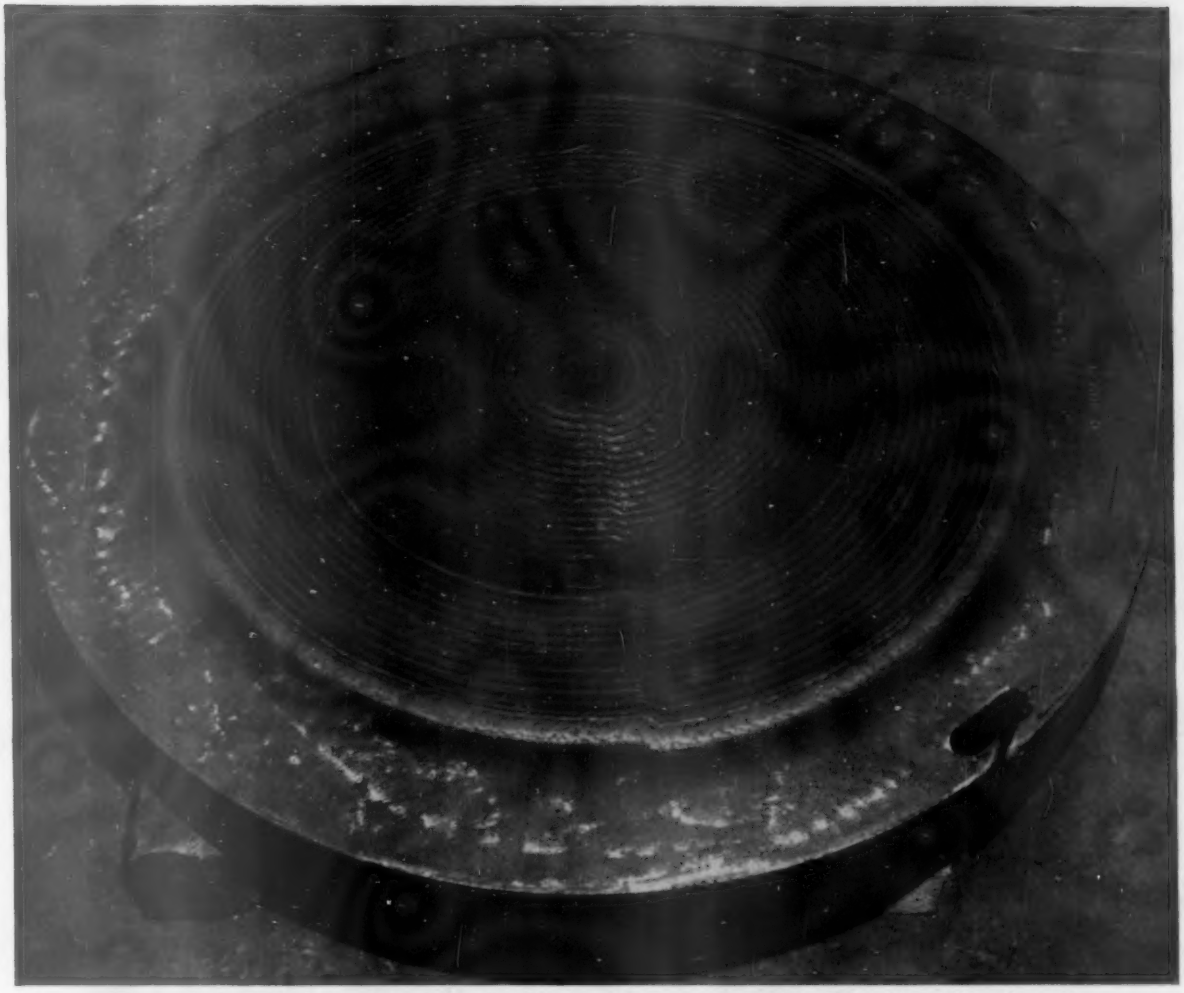
Micro-ground production silver-brazing flux for torch, furnace or induction brazing on stainless steel, nickel alloys, copper, brass, bronze, steel, berrylium-copper and all silver alloys has unlimited shelf life. S-200 Brabaloy indicates working temperatures by boiling at 212 F, dissolving metal oxides between 600 and 800 F and becoming transparent at 1,100 F. Active range between 600 F and 1,800 F. Cleans off with hot water. **All-State Welding Alloys Co., Inc.**

Circle No. 6 on Info-Aid Card.

Compound cleans abrasive polishing belts, wheels

Compound for cleaning abrasive polishing belts and wheels contains ingredient which prevents loading with metal. Belt-Life also lubricates. Can be applied with brush, swab or spray while belt is operating. **Grav-i-Flo Corp.**

Circle No. 7 on Info-Aid Card.



This part of a tube sheet sub-assembly for a heat exchanger, made by Griscolm-Russell Co., Massillon, Ohio, has a "60" Monel* overlay. "60" Monel, a corrosion-resisting high nickel filler wire, was used to make this overlay with a special welding head, automatically manipulated and controlled.

How to use Monel, Inconel and other high nickel weld overlays to improve base material service life

You can often save money by weld overlaying the exposed surfaces of steel or cast iron with a corrosion or wear resistant high nickel alloy.

When the overlay is expected to resist the corrosive action of salts, acids, heat or organic compounds, Monel* nickel-copper alloy or Inconel* nickel-chromium alloy may solve the problem.

If the overlay must resist abrasion or erosion, Inco-Hard "1"* may be used. Inco-Hard "1" deposits a Ni-Hard* iron carbide martensitic structure. Ni-Hard has turned in outstanding wear performance records for over 25 years.

The techniques of applying weld overlays can be easily applied to new equipment or to the surface of existing equipment as a salvage or repair operation. The overlay can be as thin as 1/32-inch or as thick as desired. High nickel weld overlays reduce overall cost and operating expense by improving service life.

For more information on high nickel overlay welds, or for help with problems associated with obtaining good overlays, write our Technical Service Section.

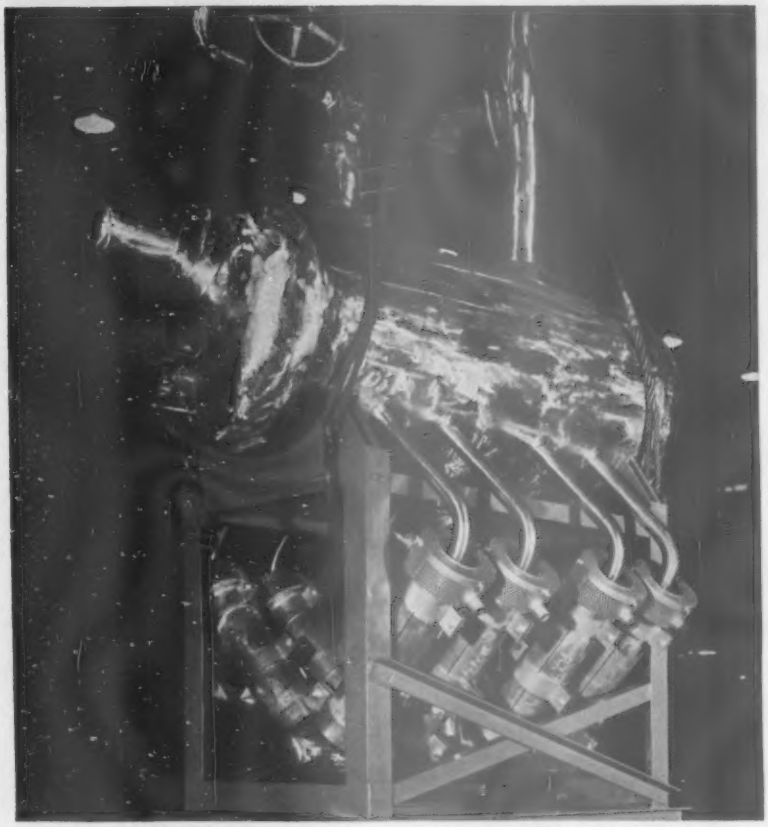
*Inco Trademark

HUNTINGTON ALLOY PRODUCTS DIVISION
The International Nickel Company, Inc.
Huntington 17, West Virginia

INCO

WELDING PRODUCTS
electrodes • wires • fluxes

ARCOS EB INSERT FOR ROOT PASS WELDING



Job report courtesy of Dominion Bridge Co., Ltd., Montreal, Quebec

Smooth, crack-free root welds made in nuclear pressure vessel from one side only. This NRU reactor surge tank is made of Type 347 stainless, 3" thick with 26" I.D. It is designed for operation up to 630°F. at 2400 psi. Because welding could be done from the outside only, Arcos EB Consumable Weld Inserts were used for the root passes. Result: complete fusion, crack-free, with smooth inner surface. Write today for complete data on EB Weld Inserts.

ARCOS

Arcos Corporation • 1500 S. 50th St. • Philadelphia 43, Pa.

Acetylene cylinder has 1,000-cu-ft gas capacity

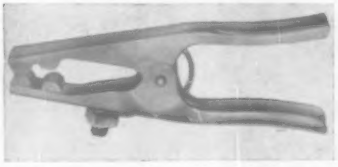
Cylinder stands 38-in. high 20-in. wide and has 1,000-cu-ft acetylene gas capacity. Cylinder reduces handling, pairs with standard 3,000-cu-ft liquid oxygen cylinder. **Coyne Cylinder Co.**

Circle No. 8 on Info-Aid Card.

Weldor's glove is made entirely of buckskin

All-buckskin weldor's glove is light yet bulky enough to insulate and give heavy-duty service. One-piece back eliminates seams that shorten glove life. **Singer Glove Mfg. Co.**

Circle No. 9 on Info-Aid Card.



Spring-loaded grounding clamp opens easily

Spring-loaded grounding clamp gives opening ease with handle to more nearly fit palm. Heavy copper braid shunts two members and avoids current flowing through heavy spring. Clamp has wide jaw opening and gives positive ground on pipes and other round objects. **Lenco, Inc.**

Circle No. 10 on Info-Aid Card.

Brazing alloys available on disposable spools

Phosphorous-copper and phosphorous-silver brazing alloys, B CuP-2 through B CuP-5, are available on disposable spools. Protection against oxidation and contaminants during shipment and storage is provided by vacuum-sealing spools in polyethylene containers. Primarily designed for oxyacetylene brazing, package is available in 25-lb spools of 0.035-in. through 3/32-in.-diameter wire and in 1½-lb spools of 0.035 and 0.047-in-diameter wire. **Westinghouse Electric Corp.**

Circle No. 11 on Info-Aid Card.

Tig torch is 300 amp, water-cooled model

Miniature water-cooled 300-amp Tig torch reaches confined areas as small as 1½-in. diameter. Torch head including transparent nozzle is 1¼ in. and uses 1½-in. long tungsten electrodes. Will accommodate 0.010-in., 0.020-in., 0.030-in., 0.040-in., 1/16-in., 3/32-in., and ⅛-in. diameters. Torch will weld up to 300 amp continuous duty cycle, weighs about 2.5 oz and is 6½-in. long. **Tec Torch Co., Inc.**

Circle No. 12 on Info-Aid Card.

Welding helmet headgear adjusts quickly to any head

"Warrior" welding helmet headgear has five fast, easy adjustments to any head or position requirement. Design eliminates need for bolts, screws, washers or nuts in headgear-to-helmet assembly. Headgear has pressure-sensitive foam sweatband. Fixed-front and lift-front frames readily interchangeable between straight and curved fiberglass shells. **Welsh Mfg. Co.**

Circle No. 13 on Info-Aid Card.

Concentrates mix instantly for magnetic particle tests

Powder concentrates mix easily, store readily, increase brilliance from 70% to 600% and give more corrosion protection. Certain concentrates formulated for oil suspensions, others for water. Concentrates can be added directly to oil after measuring proper amount in graduated cup. Uniform suspension is obtained almost immediately. **Magnaflux Corp.**

Circle No. 14 on Info-Aid Card.

BETTER STAINLESS WELDS WITH ARCOS

Arcos produces a full line of stainless filler metals...coated electrodes, bare electrode wire, consumable inserts, bonded fluxes. This across-the-board selection of filler metals, plus Arcos stainless welding know-how, assures you of the selection of the right filler metal for the most economical arc-welding process—manual, semi-automatic or automatic. Where you use Arcos stainless filler metals you build up the quality of your welds and push down your welding costs.

ARCOS

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Eliminates Spatter Grinding After Welding

YORK'S *SPAT-R-PRUF* COMPOUND 106

THREE *EASY* STEPS

1. Coat Surface
2. Weld
3. Wipe Off

A perfect paint base. No stirring or dilution necessary. No grinding after welding—spatter can be wiped away with a dry cloth.

IMPORTANT FEATURES

- Non Toxic
- Non Inflammable
- Pleasing Odor
- Harmless to Skin
- Helps Prevent Rust
- No Weld Porosity

Available in 1 gallon cans and 5 gallon cans and 55 gallon drums.

3-IN-1 YORK'S '77' SPECIAL FLUX

- For General Brazing
- For Cast Iron Welding
- For Cast Iron Brazing

A guaranteed bond even under toughest conditions.
Available: 1 lb. Cans

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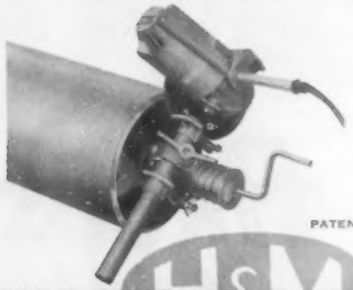
Just tear off your Bandaid...

send it and your old file to:
H & M PIPE BEVELING MACHINE CO.

and we'll know you're interested in finding out more about the H & M "BEVEL-LAND" Grinder. The "BEVEL-LAND" Grinder eliminates time-consuming handwork and assures better quality welds by accurately placing the land on the bevel. The grinder is electric or air powered and is available in two models — one for 6 to 12 inch pipe and one for 14 to 30 inch pipe. Larger models are available on request.



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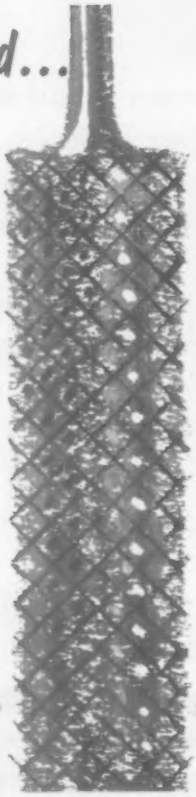


A-c Tig welder has 13 to 295-amp range

A-c Tig welder is designed for 13 to 295-amp welding range. Applications include truck, bus and boat repairs, new construction, tool and die shops, custom alloy fabrication and window frame construction. Fully-rated duty cycles are 40% at 200 amp or 30% at 295 amp. Features electrically-controlled gas and water valves, high frequency intensity control. **The Emerson Electric Mfg. Co.**

Circle No. 15 on Info-Aid Card.

Brazing rod has extruded flux coating

Low-fuming free-flowing manganese bronze rod provides cleaning and tinning action, is designed for high production where pre-fluxed rod is required. **Ampco Metal, Inc.**

Circle No. 16 on Info-Aid Card.

Gas torch cutting unit operates at any angle

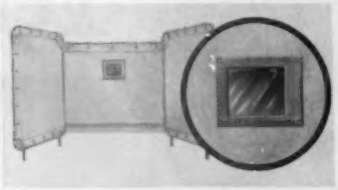
Gas torch cutting machine attached to aluminum rigid rail operates at any angle even overhead. Permanent magnets hold rail against work. Machine geared to rail moves at controlled variable speed. Accessory maintains uniform torch spacing. Rail can be bent to cut around circumferences or girth in any position. **Weld Tooling Corp.**

Circle No. 17 on Info-Aid Card.

Ultrasonic flaw detector features dry coupling

Ultrasonic flaw detector operates without liquid coupling. Ultrasonically-vibrating crystal is intimately coupled to object tested through synthetic membrane which fits tightly over transducer. Coupling membrane serves as protective skin to avoid damage caused by friction with tested objects. **Circo Corp.**

Circle No. 18 on Info-Aid Card.



Portable welding screen has viewing window

Glass welding plate in portable screen is useful for inspection, checking, training or for visitor viewing. Plate is filter shade No. 10 and is easily removed from leather reinforced pocket. **Singer Glove Mfg. Co.**

Circle No. 19 on Info-Aid Card.

40-mc induction generator has 33-kw output

Commercially-available 40-mc induction generator is capable of continuous operation at 3-kw output. Unit achieves extremely shallow cas depths in hardening steel. Thin materials can be joined with minimum power and distortion. Depth penetration at 40 mc is 0.0005 in. Grid current is adjustable externally; output is adjusted by a variac. **Induction Heating Corp.**

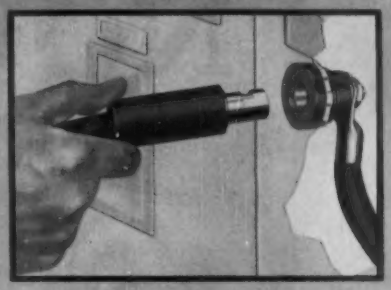
Circle No. 20 on Info-Aid Card.

Aluminum portable blower weighs about 70 lb

All-aluminum portable blower weighs about 70 lb, delivers up to 6,500 cu ft of air per minute. Available in both standard and explosion-proof models. Powered by 1½-hp motor and supplied for use with 220-440 volt a-c, 110-230-volt a-c or d-c. General purpose ventilating unit for use in welding shops may be operated in any position without loss of efficiency. **Manhattan Electric and Maintenance Co.**

Circle No. 21 on Info-Aid Card.

Specify



cam-lok

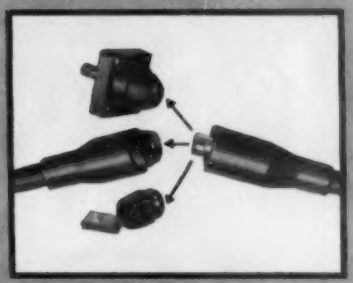
POWER CONNECTIONS

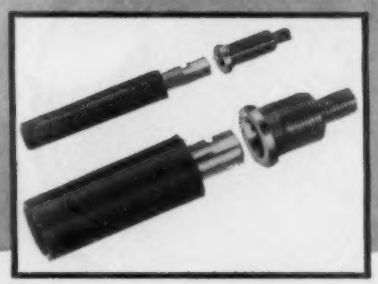
"The Standard of the Welding Industry"

CAM-LOK is standard equipment on various welding machines manufactured by . . .

- Hobart
- Miller
- Westinghouse
- Harnischfeger
- Nelson
- Forney
- Omark-Graham
- KSM Prods.
- Mid-States
- Brenweld
- Birdsell Prods.
- Vacuum Tube Prods.

. . . . and many others





Modern power distribution in the welding industry demands a fast, high pressure positive connection with minimum resistance that is rugged, simple and economical. And leading welding machine manufacturers build Cam-Lok connections into their equipment for safe, full power distribution.

Make a better connection now with Cam-Lok, and speed up your production. Write for complete line catalog on plugs, connectors, and receptacles or detail your special requirements.

cam-lok DIVISION

EMPIRE PRODUCTS, INC., 9213-E BLUE ASH RD., CINCINNATI 42, OHIO

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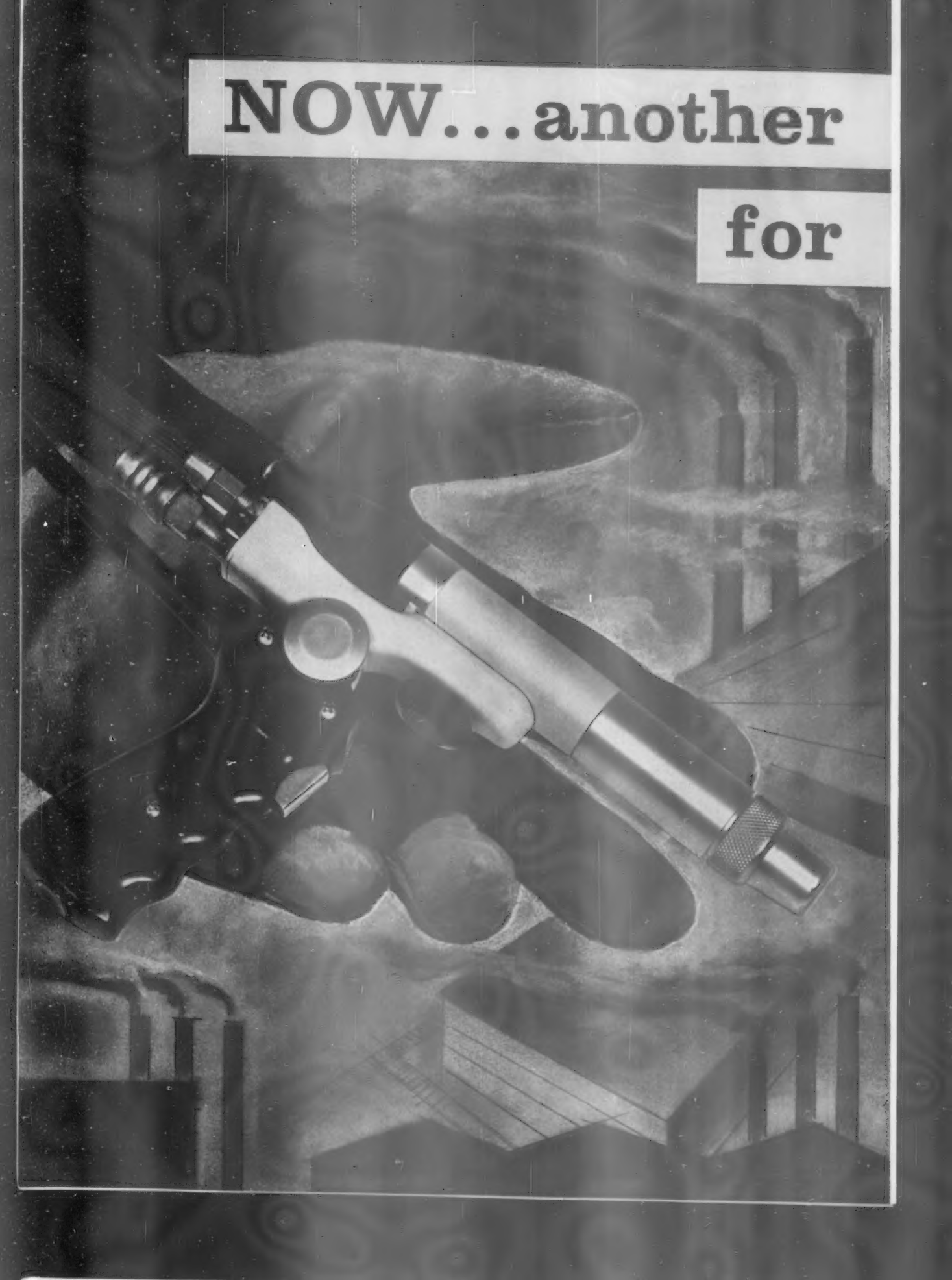
NOW...another

for



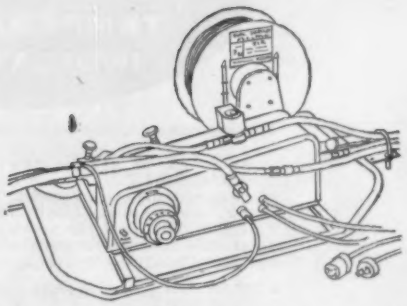
step forward

production welding

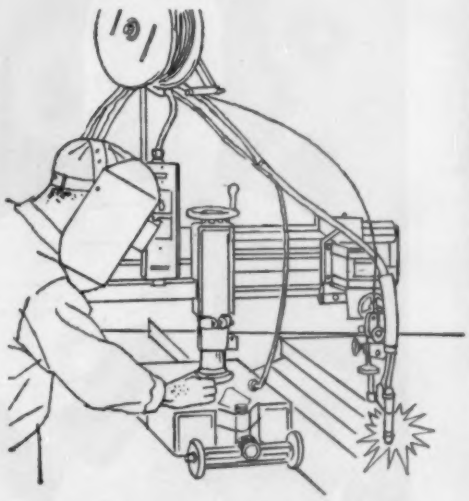
Progress means greater profits for you. The NCG AM-7 Gun for Automanual* welding is the newest, most improved consumable welding gun on the market. Its outstanding versatility, its low maintenance, its adjustable handle for welding ease and accessibility all mean increased production. And, it provides complete gas shielding using 25% less gas.

The multi-use barrel of the AM-7 Gun, designed for all MIG and carbon dioxide shielded welding processes, is interchangeable with the NCG A-10 Automatic Torch and may be used for all MIG, carbon dioxide shielded and TIG welding processes. And, for even greater versatility, a simple change of the guide tube accommodates ferrous or non-ferrous metals.

Send for complete information today. Ask for the new NCG Bulletin NH-142-E-2-F, NATIONAL CYLINDER GAS DIVISION OF CHEMETRON CORPORATION, 840 North Michigan Ave., Chicago 11, Illinois. NCG sales offices, distributors and dealers in all principal cities.



The new WC series welding control units have features that were developed to meet field requirements. Designed for consumable electrode welding processes using argon, helium or carbon dioxide shielding gases, they provide maximum versatility and economy.



Multi-purpose barrel is interchangeable with the NCG A-10 Automatic Torch for MIG and TIG welding.

NCG®

NATIONAL CYLINDER GAS

Division of CHEMETRON *Corporation*

*NCG trademark for semi-automatic welding process and equipment

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NEW NEW NEW NEW NEW NEW NEW NEW NEW

when it

MELTS

you know the *temperature!*

NEW *Markal*

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TEMPERATURE

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With Handy Adjustable Holder

The easy modern way to determine exact working temperatures!

Just mark or stroke the surface with THERMOMELT . . . when it reaches the desired temperature, the mark liquefies. There's no guesswork, no wasted time or material . . . THERMOMELT is the quick, precise way to determine heating temperatures. Accurate to within ±1%.

A Stik For Every Temperature from 113° F. to 2000° F.

SEND TODAY for free THERMOMELT literature and pellet sample (indicate temperature desired).

ALSO AVAILABLE IN LIQUIDS AND PELLETS for inaccessible or hard-to-measure applications. Wide range of temperatures.

Made by the Manufacturers of Markal Paintstik Markers and Protective Coatings.

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Magnetic level leaves both hands free

All-purpose magnetic level for flat and curved surfaces leaves both hands free. One easy-to-read bubble enables accurate 40-deg, 90-deg, and horizontal reading. Lev-l-all is 3⅜-in. long 1½-in. high and ⅞-in. wide. Weighs 2½ oz. Alnico permanent magnets are concealed in plastic body. Available with adapter for non-ferrous surfaces and belt pouch. **Alan-Lea International Inventions Corp.**

Circle No. 22 on Info-Aid Card.

Rising blocks protect flame cutting tables

Cast-iron bee-hive shaped blocks fit on cross supports of any flame cutting table, to hold steel plate clear and prevent damage to table bed. Blocks have great flame resistance and long life. Blocks come in 5/16-in. and ⅜-in. slot sizes. Specials can be made. **Brown & Sharpe Mfg. Co.**

Circle No. 23 on Info-Aid Card.

All-purpose hook can be released while loaded

Hook can be released while loaded permiting operator to stand clear. Positive lock prevents opening under any load conditions except when intentionally released by pull ring. Fits almost any fitting, has wide opening with small girth. Approved for U. S. Navy shipboard and amphibious use. **Merrill Bros.**

Circle No. 24 on Info-Aid Card.

E-7018 electrode can be used in all positions

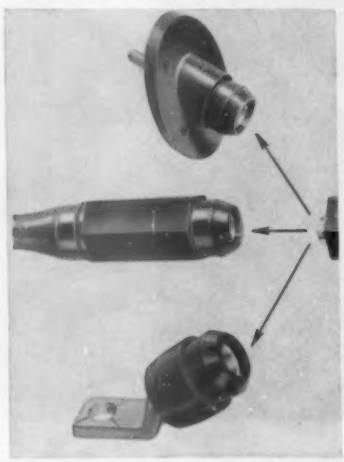
E-7018 low-hydrogen iron-powder electrode is for use in all positions with a-c or d-c reverse polarity welding. Deposits meet MIL Specification E-22200/1. Applications include joining low-alloy high-strength steels, hardenable steels, high carbon steels, high sulphur steels and enameling steels. Available in ⅛, 5/32, 3/16, 7/32 and ¼-in. diameters. **Metal & Thermit Corp.**

Circle No. 25 on Info-Aid Card.

High-speed cut-off saw needs no cooling, clamping

Cut-off saw handles high-volume production without clamping or cooling. Cuts all carbon and stainless steel shapes and many new alloys with tooth shape in alloy steel circular saw. This produces semi-milling action rather than biting and chipping. Open table surface provides 27-in. clearance between blade and column and takes up to 16-in. widths of long stock for through-cutting. Cutting times range from 11 seconds for through-cut on 12-in. I-beam to 1 second or less on 2-in. by 2-in. by ¼-in. angle flat bar. **Production Machinery, Inc.**

Circle No. 26 on Info-Aid Card.



Cable accessories available up to 750 MCM

Cable connectors, panel and machine receptacles, and cable lugs fit flexible power cable up to 750 MCM extra flexible. All available in waterproof neoprene-insulated styles or hard fibre insulated types. **Cam-Lok Div.**

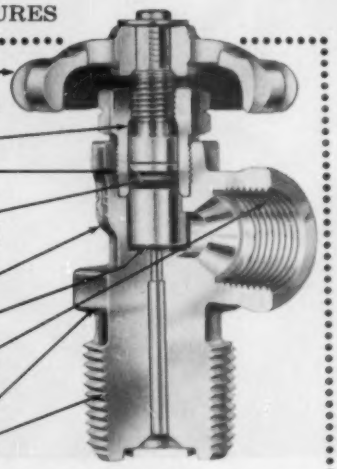
Circle No. 27 on Info-Aid Card.

new!
RegO series 600
acetylene cylinder valve

OFFERS ALL 3!

- **EASY, CONVENIENT HANDWHEEL "O"-RING OPERATION** . . . no wrenches to bother with, lose or misplace, no packing to adjust . . . opens, closes positively with a twist of the hand
- **SUPERIOR, MONEY-SAVING DESIGN** . . . "O"-ring wipes on replaceable bonnet, *not* on valve body . . . should wiping surface get damaged, entire body, or valve, need *not* be replaced
- **FIELD-PROVEN, TIME-TESTED "REGO" DEPENDABILITY** . . . exact overall design fully tested and proven in years of use in the LP-Gas industry . . . now with acetylene-acetone-compatible "O"-ring for use in welding field

PLUS THESE
MORE-FOR-THE-MONEY FEATURES



UMBRELLA-TYPE HANDWHEEL
Can't collect water; permits visual stem inspection. (Note: also available with flat disc-type handwheel).

BACK SEAT
Extra safety feature; secondary stem seal.

BONNET-BODY MAKEUP
Left-hand thread. Trim assembly can't back out.

"O"-RING
Leakproof stem seal compatible with acetylene and acetone for smooth, long maintenance-free operation.

FORGED BRASS BODY
Extra strength, longer life.

NYLON SEAT DISC
For positive shut-off with minimum effort.

OUTLET CONNECTIONS
Accurately machined to conform to CGA specifications. (511 POL or 301 Commercial available)

1⅛" WRENCH FLATS
Provide ease of installation.

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NGT (extra long) available in ½", ¾" and 1"

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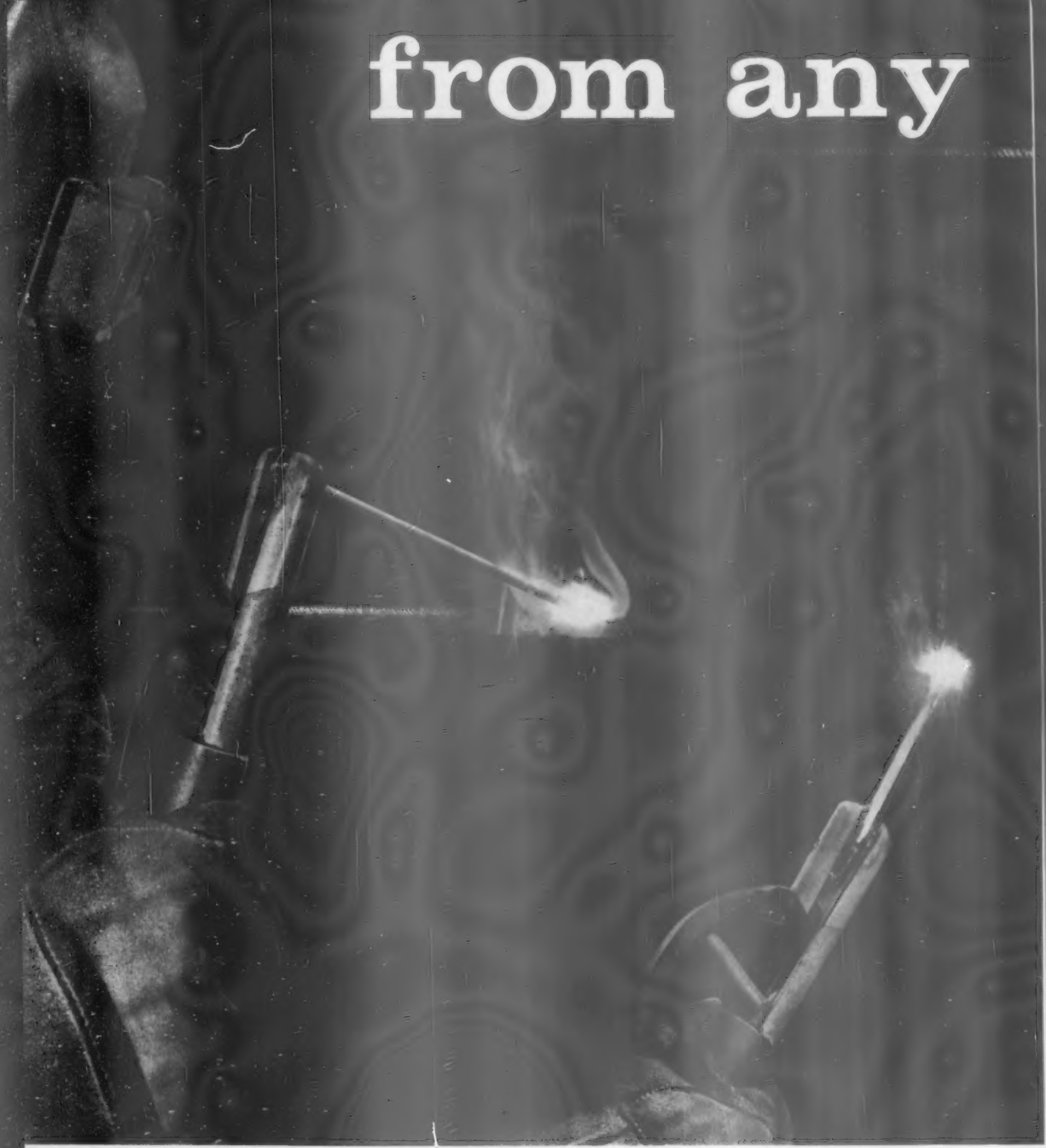

HORIZONTAL — Try the new SW610 on single and multipass fillets and you'll find it superior to any electrode in its class. A less convex bead, due to better wetting action with sufficient throat reinforcement to prevent cracking . . . a quieter, smoother arc, producing far less spatter . . . a stronger coating crater or flux crucible for better arc direction and deeper penetration. From the standpoint of value — greater operator appeal and higher deposition efficiencies, resulting in less cost per pound of deposited metal.

VERTICAL DOWN — Here's where the SW610 is really in a class by itself. It's the only E6010 electrode capable of depositing a vertical down stringer pass free of pits. And this really "shows up" where x-ray checking is required. This advantage, coupled with its strong coating crater and deep penetration, makes the SW610 a natural for pipe welding. From the standpoint of value — rejects and rework time are reduced to an absolute minimum, especially when radiographic requirements must be met.

angle...

you can put metal where you want it with the new A.O.SMITH SW610

The new A. O. Smith SW610 outperforms any electrode in the E6010 class. In fact, it's so good in all positions that you might say it's in a class by itself.

You get all this with the SW610: Strong coating crater for good arc direction . . . greatest resistance to breakdown . . . no pitting in the vertical down position . . . smoother metal transfer for maximum operator appeal . . . deep penetration for rough jobs . . . better wetting action, producing less undercut . . . less spatter, resulting in reduced cleaning time.

Welds too good to be true. All you have to do to test the SW610 is to send for free sample electrodes. Or get in touch with the A. O. Smith representative near you.

OVERHEAD — Better arc direction is the secret of SW610's amazing out-of-position efficiency. No loss of arc direction due to electrode breakdown and weak crater. Instead, a strong coating crater produces better arc direction, enabling operator to put metal where he wants it . . . smoother metal transfer results in less spatter . . . fast-setting slag and good wetting action produce a desirable flat bead. From the standpoint of value — easy out-of-position welding with costly stub loss reduced to a minimum.

Through research . . . a better way

A.O.Smith
CORPORATION
WELDING PRODUCTS DIVISION
A. O. SMITH INTERNATIONAL S. A.
Milwaukee 1, Wisconsin, U.S.A.

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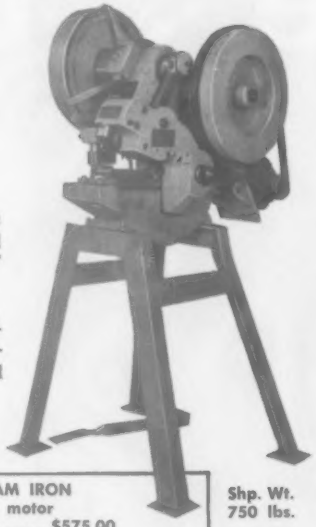
For more facts Circle No. 169 on Welding Info-Aid Card

Large and Small Fabricators of steel and ornamental iron swear by it ...

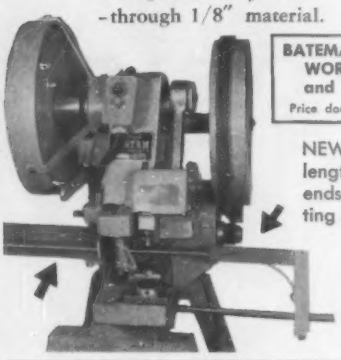
BATEMAN BANTAM IRON WORKER



The Bantam cuts and punches fast and clean . . . no grinding necessary. It's versatile, and saves time and labor! Cuts 2" x 2" x 1/4" angle and 1/4" x 4" flats.

Punches 1/2" hole through 1/4" material. Operates by hand or foot, uses 3/4 hp motor (1750) rpm., powered with flywheel and drive gear.

The Coper will cope 1-1/4" -through 1/8" material.



BATEMAN BANTAM IRON WORKER, with motor and stand $575.00
Price does not include Blades, Punches or dies.

Shp. Wt. 750 lbs.

NEW ACCESSORIES: Gauge for cutting to length, Guide for Flat Bars for cutting on ends, and Angle Iron Trimming Guide, for cutting at a 45 degree. Write for details.

WRITE TODAY for complete information and name of nearest distributor

Bateman Foundry & Machine
MINERAL WELLS, TEXAS

Iron-free electrode designed for overlay

Iron-free aluminum bronze arc welding wire and filler rod are designed specifically for overlay applications. Suggested for use where high hardness not required. Available in 36-in. lengths and bare spooled wire. Resistant to salt water and corrosion. **Ampco Metal, Inc.**

Circle No. 28 on Info-Aid Card.

Aluminum clamp doubles work-area accessability

Threadless-spindle aluminum clamp nearly doubles work-area accessibility at pinning point. Deep-throat clamp has finger-tip-control thumb screw for applying pressure without frame distortion or without causing spindle to turn and mar work. Comes with either anvil or vee spindle in carbon or stainless steel. Solid beryllium copper vee spindles also available. Sizes: 4 in. by 4 in. and 6 in. by 6 in. **United Associates.**

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HIGHEST YIELD
They mean National Carbide's calcium carbide —gets ten tests!
Always nearby— in the BIG RED DRUM. Wire for supplier...
NATIONAL CARBIDE
Calcium Carbide

National Carbide is a product of:

AIR REDUCTION CHEMICAL & CARBIDE CO.

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Low cost Mig package includes gun, power source

Complete Mig package includes AH20-E gun and CAV power source. No separate controls are needed for low-cost package. Single control on power source adjusts arc voltage. Knob on gun adjusts wire feed speed. Power source rated 200 amp d-c 60% duty cycle. With package, weldor can make many short-length welds in confined spaces up to 50 feet from power source. **Air Reduction Sales Co.**

Circle No. 30 on Info-Aid Card.

Magnetic force welders join critical materials

PVA-1 magnetic force resistance welders are for production welding of critical materials including silver tungsten to brass, stainless to brass, copper to copper. Welders come in 20, 30, 50 and 75-kva models. **Precision, Welder and Flexopress Corp.**

Circle No. 31 on Info-Aid Card.

Tip holder allows two cuts with one torch

Adjustable tip holder permits two simultaneous cuts in spread of 1½ in. to 12 in. from one machine cutting torch. TH-98 operates on any gas. O-ring seals at pivot point provide complete safety to 360-deg circumference of tips. Recommended for sheet and plate strip cutting by **The Harris Calorific Co.**

Circle No. 32 on Info-Aid Card.

Portable engine generator weighs only 82 lb

Portable engine generator provides 1,500 watts of intermittent a-c power, weighs 82 lb with carrying handle. Idling control saves up to 60% in fuel cost, according to firm. Direct-acting electro magnet has no moving parts. **Wincharger Corp.**

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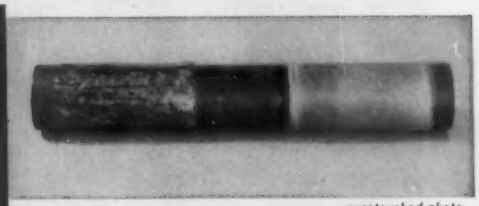
How flame spraying can pay for itself in your shop in a very short time

ONE EXAMPLE
Hard facing time cut from 4 hours to 25 minutes



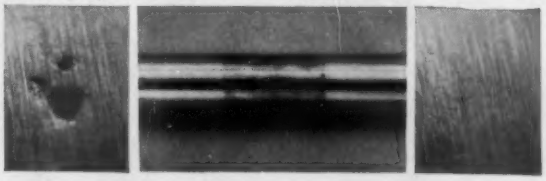
unretouched photo

The two end sections of this shaft have been built up with AMS 4775. Section at left applied by welding – time 4 hours; section at right by flame spraying – time 24 minutes, 45 seconds.

QUESTION: Look at the picture. Which end would you prefer to grind finish?

Here's the whole story. We took a 15″ length of 2.5″ mild steel shafting and undercut two 5″ sections .050″ on the radius. We then sent the shaft to a nationally-known job shop with instructions to apply AMS 4775 on the left-hand section, sufficient to finish at 2.5″. Weight of welded-on alloy was 17⁹⁄₁₆ ounces – time spent by one of their top men – 4 hours (including preparation).

Then we blasted the second section with steel grit and flame sprayed it with AMS 4775 in powder form (ThermoSpray Powder 15E). The coating was then torch-fused. Weight of deposited alloy – 11⁵⁄₁₆ ounces; surface preparation, set-up and pre-heat – 12 minutes; spray time – 5.5 minutes; fusing time – 7.25 minutes.



unretouched photo, in center, shows finish-ground shaft. Insets, magnified about 50X, show pits in welded section (left) and no pits in flame sprayed section at right.

We then sent the shaft out to a grinding shop with instructions to clean up at 2.500″ plus. The flame-sprayed section cleaned up at 2.510″ but welded section still showed pits when grinding was stopped at 2.477″ Rockwell of welded end Rc-61, sprayed end Rc-60.

Pump plunger being flame sprayed with METCO ThermoSpray® Powder Gun

These flame-sprayed coatings are solid, homogeneous; usually superior to those applied by other methods. You can apply them at high speed, with lower material and finishing costs. In addition to AMS 4775, a number of other powders – including tungsten carbides – are available for various service requirements; all may be fused–some used as sprayed for certain service requirements.

For further information on this high-speed, money-saving, hard-facing process, phone, write or wire.

METCO INC.
FORMERLY METALLIZING ENGINEERING CO., INC.
Flame Spray Equipment and Supplies

1127 Prospect Ave., Westbury, L. I., N.Y. Telephone: Edgewood 4-1300 Cable: METCO
In Great Britain: METCO., Ltd., Chobham-near-Woking, England

FREE BULLETIN

FREE BULLETIN: Send off the coupon for this and other useful information which shows how flame spraying pays for itself–in a very short time. No obligation, of course.

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City _____ Zone _____ State _____

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Tempilstik°—a simple and accurate means of determining preheating and stress relieving temperatures in welding operations. Widely used in all heat treating—as well as in hundreds of other heat-dependent processes in industry. Available in 80 different temperature ratings from 113°F to 2500°F . . . $2.00 each.

Send for free sample Tempil° Pellets. State temperature desired . . . Sorry, no sample Tempilstiks°

Most industrial and welding supply houses carry Tempilstiks° . . . if yours does not, write for information to:

WELDING SALES DIVISION

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132 West 22nd St., New York 11, N. Y.

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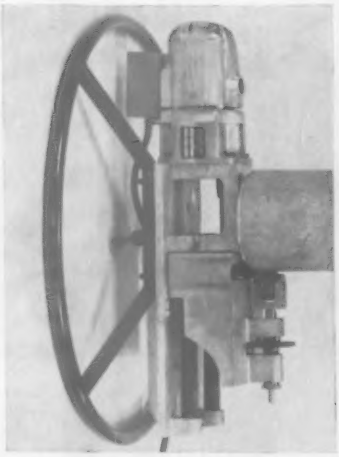


Pipe beveling machine squares joint end

Lathe unit weighs 50 lb, operates from 115 volt a-c or d-c power source with air motor optional. In alloy pipe, stainless, etc., unit bevels 4-in. and 6-in. schedule 40 and 80. In carbon pipe, cast iron, or ductile iron, range is 4 in to 8 in. Aluminum pipe can be handled 4 in. through 12 in. and, with minor alterations, will bevel 14 in. and 16 in. Unit bevels pipe and squares joints. Cuts 4-in. alloy or carbon in 2 minutes, 4-in. aluminum in 10 seconds actual cutting time. Sets up in about 2 minutes. Operates in shop or field. **Hogden, Lovett & Powell.**

Circle No. 34 on Info-Aid Card.

Water-cooled Tig torch has 90-deg head

Continuous duty 350-amp Tig torch with 90-deg head is water cooled. Model 4442 has 2-in. overall head interference clearance when using special cut-down nozzles. Will accommodate tungsten electrodes from 2-in. to 6-in. long and from 0.010 to 5/32-in. diameter. **Tec Torch Co., Inc.**

Circle No. 35 on Info-Aid Card.

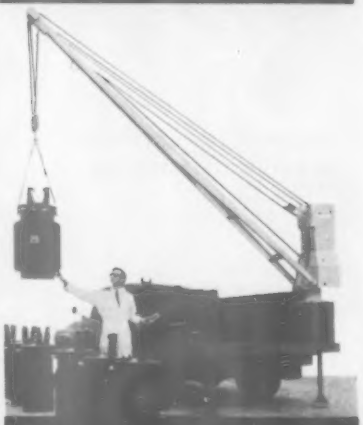
X-ray unit comes in 275 kvp, 300 kvp models

X-ray unit, available in 275-kvp and 300 kvp models, is designed to be used where portability is not required. Equipment contains same components as portable unit, but cost is lower. **Sperry Products Co.**

Circle No. 36 on Info-Aid Card.

Economical — Dependable
Safe

ONE MAN MATERIAL HANDLING *New-*
Model ROC-24-LC



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- 3,500 lb. capacity
- 9 ft. boom standard longer boom lengths available
- Push button portable remote controls
- 360 degrees power rotation
- Light weight, compact
- Vehicle mounted

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POWER HOISTS ◆ POWER BOOMS ◆ POWER ROTATES ◆

Write today for illustrated literature, specifications and price lists on all models of AUTO CRANE.

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Never a strain-with Auto Crane

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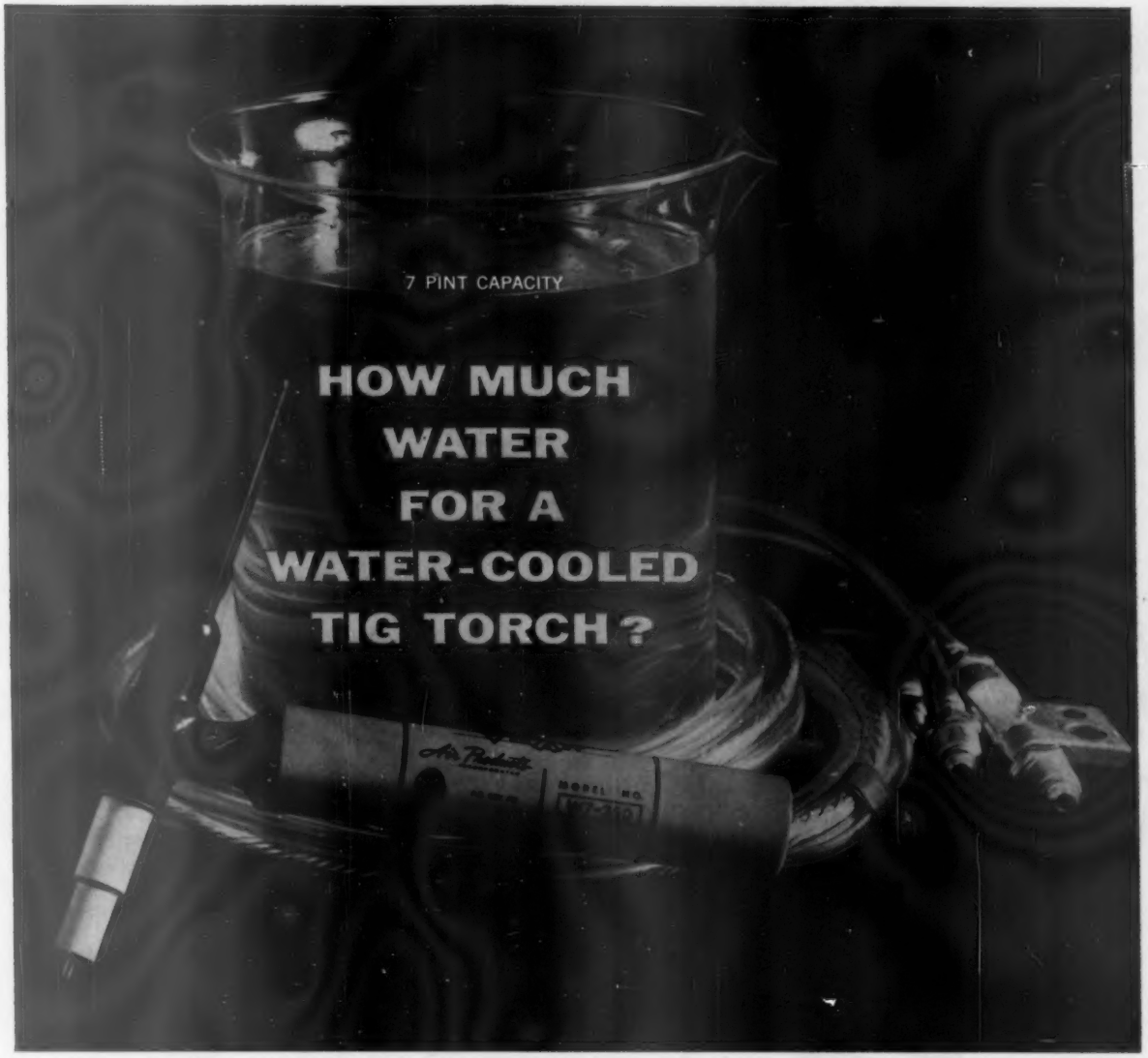

THIS KG VisArc® TORCH PUTS 3½ TIMES AS MUCH COOLING WATER THROUGH THE HEAD EVERY MINUTE

Most quality torches circulate only 2 pints of water every minute; KG Vis Arc circulates 7 pints. You get an added increase in cooling efficiency, a greater margin of safety—and you get it at low cost. Next time you order, see your distributor's complete line of KG Vis Arc TIG welding equipment, from 50 to 500 AMPS—highest quality at lowest cost.

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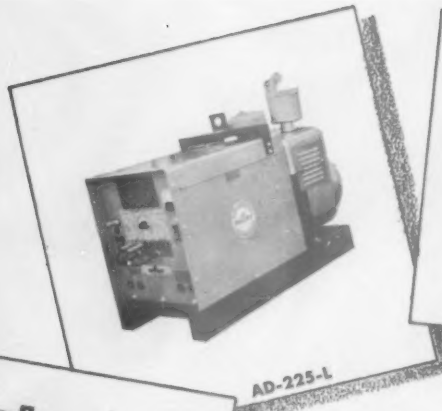
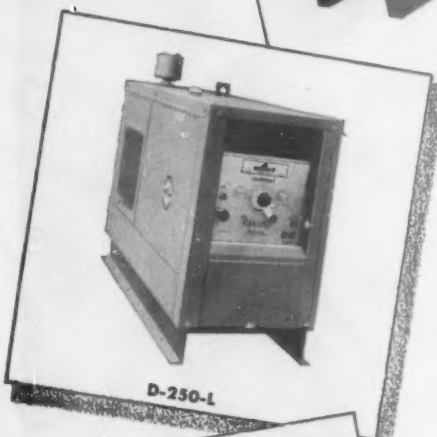


AD-225-L

D-250-WE

AEA-200-LE



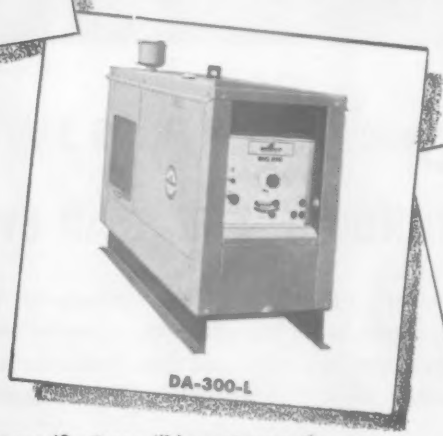
D-250-L

FIRST and FINEST FAMILY of WELDER/POWER PLANTS

Miller was one of the first with a successful combination welder/power plant. This established a lead never lost notwithstanding the most widespread efforts at copying and duplication. Shown here are gas and diesel engine driven welders in d-c and a-c/d-c models.

In this group there is a welder/power plant size, type and price to meet every practical need — all available with field-tested accessories and trailers.

DD-250



DA-300-L

DAH-350-L

Complete specifications will be sent promptly upon request. Please indicate model or models.

miller ELECTRIC MANUFACTURING COMPANY, INC. • APPLETON, WISCONSIN

EXPORT OFFICE: 250 West 57th St., New York 19, N. Y. • Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

JUNE, 1961

Our 45th Anniversary Year

ESTABLISHED 1916

Sharper focus

ONE HUNDRED YEARS AGO machines provided only 25% of the energy required for industrial production. The rest came from human and/or animal muscle and sweat.

Mechanization of work freed man from his role as a beast of burden and focused attention on his judgment, experience and training instead. Automation, the extension of mechanization, sharpens that focus.

As happened when mechanization was first introduced, automation is often fought against because it supposedly puts people out of work. But history disproves this. Just as mechanization produced more work than it destroyed, so too does automation create more jobs than it abolishes.

True, some people may have to change jobs; there will be some temporary dislocations — but not continual unemployment as some members of our Congress and other groups would have us believe.

The automobile produced more employment with its resulting service garages and filling stations than could ever have been found in stables and blacksmith shops. And there are more telephone operators now with our dial-phone system than there were before its inception.

The occupations eliminated are usually those bone-wearying or drudgery-filled jobs which no one would want in the later years of industrial progress anyhow.

Automation efficiently and often less expensively places much more at everyone's disposal. And this is true of welding.

The automatic welder, however, will never entirely eliminate the stick electrode weldor. Although it was almost impossible to find a ¼-in. electrode at the recent AWS Welding Show, stick electrodes and the men who use them will be in demand for many years to come.

Automatic welding opens new avenues for many new users. The weldor has only to give a day's work for a day's pay to keep pace.

MISSILE AGE PAUL BUNYAN

LIFTS 80,000 POUNDS WITH THE STRENGTH OF

ATOM·ARC 'T'

Hufford Corporation specified all-welded construction for maximum strength, minimum weight

Transporting 80,000 pound rocket engine units and erecting them on test stands requires equipment that is unusual both in design and strength properties. Hufford Division of the Siegler Corporation met this challenging project for Thiokol Chemical Corporation with this mobile handling unit called the Transrector.

The first requirement as a transporter necessitated the use of a minimum weight material for fabrication to reduce the overall hauling load. The use as an erector made strength a highly important factor. This high strength to low weight ratio was achieved through the exclusive use of T1 steel. To retain the inherent strength of T1, the design engineers specified all-welded construction.

Alloy Rods Company's ATOM·ARC "T" more than satisfied Hufford's needs. The only electrode designed specifically to weld T1 steel in all applications, ATOM·ARC "T" weld metal physical properties equal or exceed those of T1 steel in the "as welded" or "stress relieved" condition for 100% design joint efficiency. ATOM·ARC "T" electrodes are also excellent for many other applications where high strength welds are required.

Detailed application information about ATOM·ARC "T" in data sheet form is available by writing Alloy Rods Company, P. O. Box 1828, York 2, Pennsylvania.

ALLOY RODS COMPANY

YORK, PENNSYLVANIA

SALES OFFICES & WAREHOUSES; BOSTON, NEWARK, PHILA., PITTSBURGH, BIRMINGHAM, CLEVELAND, CHICAGO, SAN FRANCISCO & EL SEGUNDO, CAL.—DISTRIBUTORS IN ALL OTHER PRINCIPAL CITIES

TWENTY YEARS OF LEADERSHIP IN THE DEVELOPMENT OF QUALITY ALLOY ARC WELDING ELECTRODES

Welding Engineer

YOUR WELDING COSTS will increase an estimated 50% — if you eliminate all your positioning equipment.

By positioning equipment we mean any device used to locate weldments more conveniently for fabrication; specifically, to tilt, revolve and/or elevate weldments quickly and safely for efficient downhand welding.

Why the emphasis on position?

Out of every welding dollar, approximately 86% goes for labor and overhead, and this is the only area where sizeable and sensible savings can be made.

It is accepted fact that the best welds are made in the downhand position, permitting an increased welding speed of approximately 280% over that required for overhead welds.

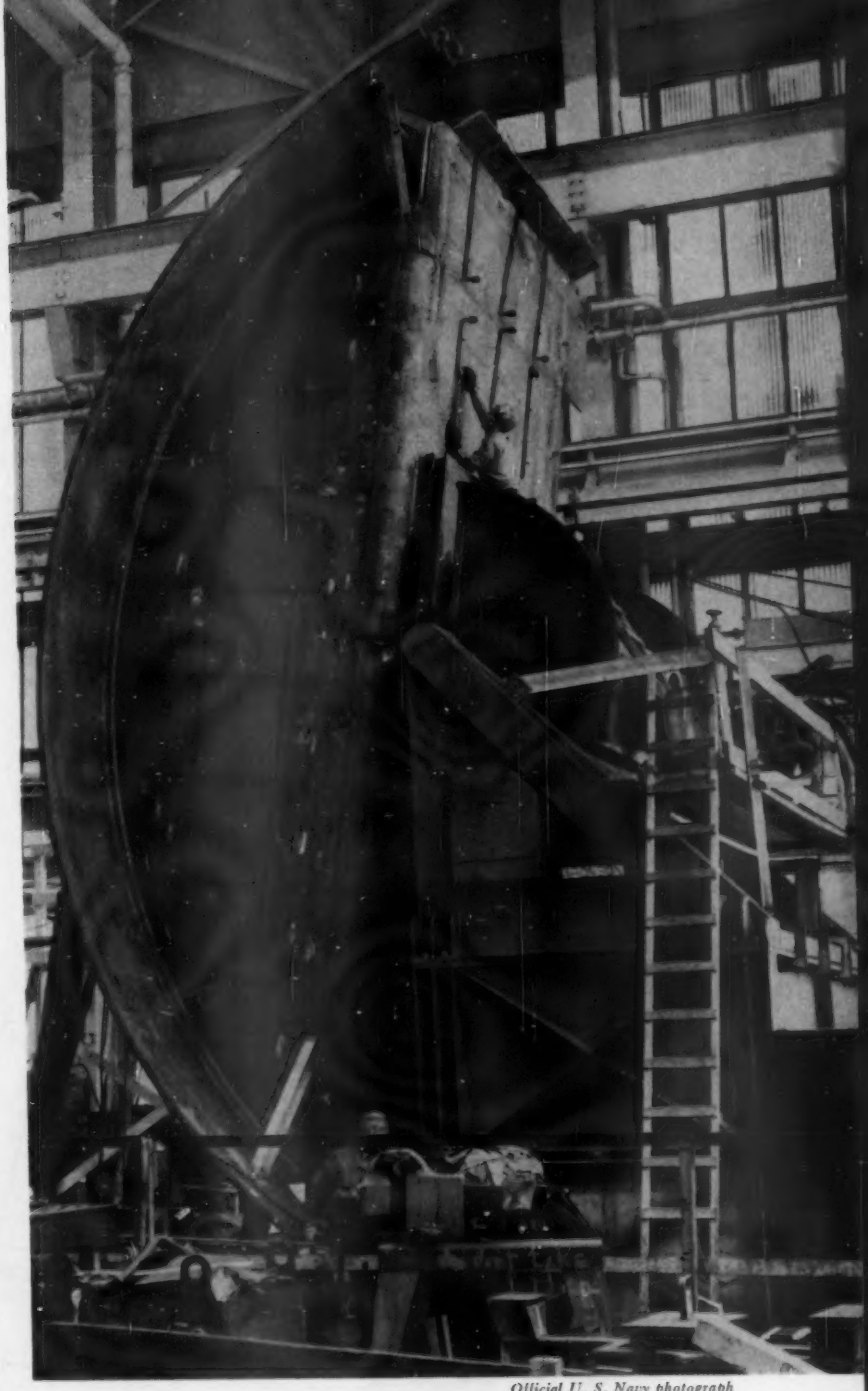
The increased speed might be considered advantage enough. However, positioning for downhand welding also permits the weldor to use a downhand electrode which is hotter and larger than the all-position electrode.

Result: a more economical, higher quality weld with much less spatter.

Out-of-position welds often work against gravity, require smaller electrodes, lower welding currents and other factors which slow welding operations.

And the ratio of your savings increases directly in proportion to the size and complexity of the particular weldment.

Yet on a particular welding job, arc time represents less than one-half the total welding time. The rest of the time is used in setup and post-welding operations, another area in the labor-



Official U. S. Navy photograph

It's position that counts!

overhead factor where large savings can be realized.

For example, using the old method of sling, hoist and bench, the weldor had to arrange and attach a suitable hoisting sling to the tack-welded assembly, secure the sling to the hoist and elevate the assembly to bench height or some other working position.

He then had to block the piece, disengage the sling and then start to weld. To gain the advantages of downhand welding, this handling cycle would be repeated many more times. Obviously, a large part of production time is wasted, particularly if additional help is required to handle the hoists and slings.

With a proper positioner, however, the weldor simply mounts the assembly to the positioner table, secures it with clamps to tee-slots or locks it in a predetermined fixture.

With this single setup and with push-button control, the weldor can raise, lower, rotate or tilt the entire assembly.

Naturally, selection of a proper welding positioner for any production or maintenance use depends on several factors: total weldment weight, including weld metal to be deposited; the weight of the fixture holding the weldment; and the weldment's center of gravity.

A typical positioner rating might read 6,000 lb maximum load at 12-in. center of gravity above the table and 12-in. eccentricity. Rotational speed range and tilt speed of the table would also be stated, as would the variable speed range or constant speed.

Center of gravity may be determined by calculation, suspension or weighing, depending on the size and design of the weldment. For example, relatively small weldments with a simple design can be safely positioned by calculation alone.

Larger, heavier weldments with irregular shapes, however, will have to be weighed and/or suspended in at least two positions to determine the center of gravity.

All positioners are rated for certain forces at a given distance from the table and center of rotation. The product of load and perpendicular distance between load and rotation axis is called torque. That is:

$$T = Fd$$

This equation states that for any given torque, any increases in lever arm or distance (d) must be accompanied by a decrease in force (F) or vice versa. (Distance denotes distance from the axis of rotation to the load's center of gravity.)

Thus, various combinations of force and distance can be obtained as long as their product-produced torque does not exceed the allowable maximum.

For example, if the combined center of gravity of load and fixture is 36-in. from the table face, then tilt torque is:

$$T = W\ (S + 36)$$

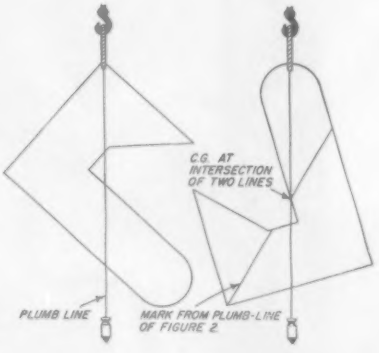
Where W equals combined weight of load and fixture and S equals the distance from table face to yoke pivot point.

Thus, if the machine in figure 1 were used, allowable tilt torque would be 2,900.

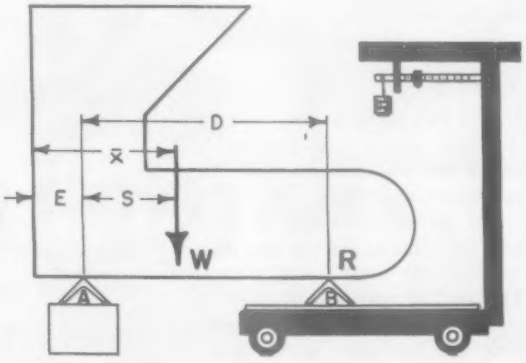
In figure 2, rotational torque is obtained by taking the product of the combined weight of load and fixture, and the amount of the combined center of gravity is eccentric:

$$T = We$$

Where W equals combined weight of load and fixture and e equals eccentricity.



SUSPENSION of large weldment (left) of irregular shape in two positions will accurately determine center of gravity. Weighing of irregular weldment (below), calls for knife-edge supports on both scale and ground. R (scale reading) times D, divided by W (total weight) will give S, or distance from support A to center of gravity.



Thus, allowable rotational torque for the machine would be 6,000 (12) lb-in.

Torque, however, is not an isolated factor; it is directly related to horsepower and speed:

$$\text{Horsepower} = \frac{\text{speed} \times \text{torque}}{\text{constant}}$$

All welding positioners have a maximum tilt and rotation torque which is the basis for design of component parts and for rating charts.

In the case of rotation, the power curve required at the table for various positions of the load during one revolution will result in a modified sine wave (see figure 3). This curve is actually the duty cycle from which power requirements are determined.

If the power required for one revolution of the table is plotted against table speed, the curve will indicate a constant-torque application.

The above equation shows that with torque remaining constant, any increase or decrease in table rotation speed must be accompanied by a corresponding increase or decrease in horsepower. That is, if table rotation speeds exceeding those listed in the ratings are desired, more horsepower must be provided for any given torque.

(*For a discussion of speed controls, see boxed material.*)

Of course, if torque were reduced by reducing the load or load eccentricity, then the speed for a given table rating could be increased without changing the motor size.

Constant and variable speed power drives, hydraulic systems and the manual method are used for positioner tilting and table rotation.

Intermittent operation of a constant-speed motor will vary the position of a weldment as it is rotated past the weldor. The variable-speed motor can be set to move the weldment at a predetermined, constant rate of speed. Both are suitable for automatic welding if rotation speeds are comparable to specified welding speeds.

Within the positioner grouping are headstocks and tailstocks, special positioners with vertical tables which cannot tilt.

The headstocks are powered for table rotation of 360 deg, while the tailstocks serve as idlers. They are usually used in combination; however, both may be used

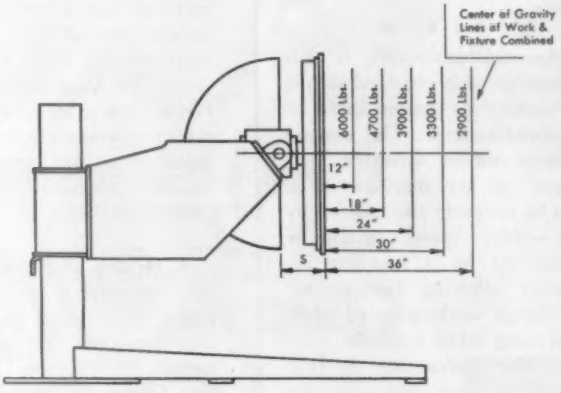


FIG. 1 — Ratings based on center of gravity from 12 to 36 in. from positioner table.

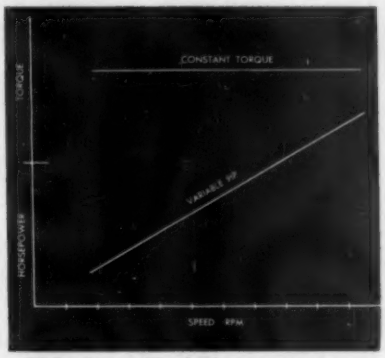


FIG. 3 — Typical constant-torque application.

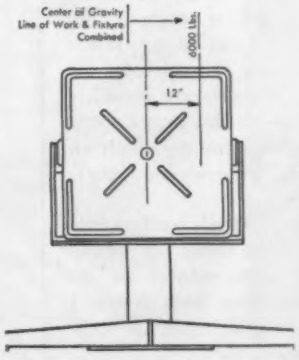
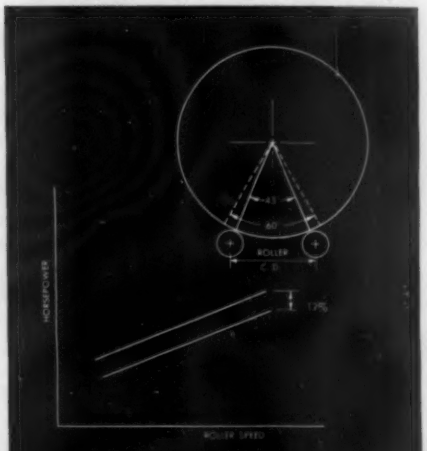
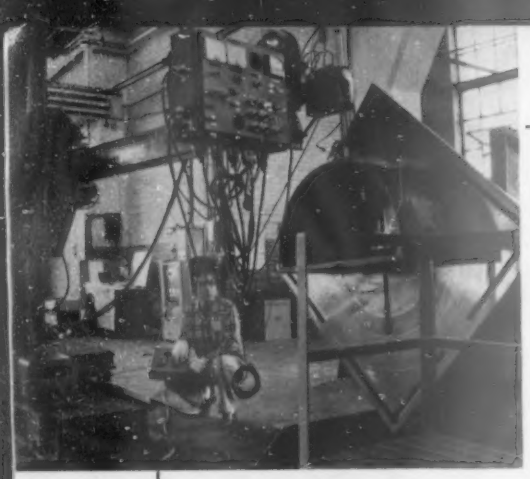


FIG. 2 — Product of the combined weight of load and fixture, and the amount the combined center of gravity is eccentric, gives rotational torque.

FIG. 4 — Roller center distance maximum is 45 deg included angle.





Electronic controls offer several advantages

by Edward W. Gardiner
Servospeed Div.
Electro-Devices, Inc.

One of the primary functions of a welding positioner is to position at a required speed This presupposes a form of variable speed control.

Speed changes can be made by gear selection, change of pulley and sprocket ratios, variable pitch or vee-belt pulley drive.

Electronic motor speed controls, however, are ideally suited to positioning equipment and offer advantages unmatched by mechanical speed changers.

The motor speed controls are systems which permit the operation of a d-c motor from an a-c line. (Direct current motors are used because they can be operated over a wide speed range.)

In operation, constant d-c voltage is applied to the motor field and variable armature voltage is applied to the motor armature. Varying the latter voltage by means of thyratron tubes varies the output speed of the motor.

* * *

The most important advantage of the electronic motor control is its ability to maintain constant speed under varying load conditions. Normally, a motor tends to slow down as load is applied, and any speed changes would be observed in the finished weld.

In electronic controls, circuits sense load variations and feedback this information to maintain constant motor speed during the entire revolution of the workpiece.

Result: a constant bead throughout a complete revolution.

Even though the motor is overloaded for a short period, the overall or integrated load on the motor for one revolution is less than 100% load and no damage will occur. However, provision must be made in the electronic control to handle these momentary overloads.

* * *

Another advantage is that motor speed is changed simply by dialing the desired speed on a potentiometer. The control station can be mounted anywhere on the machine or it can be portable and carried by the weldor. Speed can also be controlled by a foot-potentiometer allowing the weldor to change working speed while operating other controls.

A final advantage is that controlled acceleration is easily provided in electronic motor speed controls. Thus, with the motor stopped, desired speeds can be set. When the machine is started, the motor will accelerate smoothly and evenly to this preset speed without imposing overloads on the motor or associated gearing.

Since electronic technicians would not be doing the servicing, all parts subject to replacement have been designed for easy and rapid plug-in substitution.

with other types of positioning equipment.

Still another group of positioners are the turning rolls, which resemble upside-down roller skates with either power or idler rollers. Usually, one, and sometimes both, rollers are adjustable.

When mounted on self-propelled rail cars, power and idler rolls can be used in longitudinal welding operations. The car can be powered independently or by the turning roll's power unit.

The turning rolls are rated on their roller surface speed and the relationship of speed, horsepower and torque is the same as for positioners and headstocks.

An important factor to consider when using turning rolls is the distance between roller centers in the work's plane of rotation. True load on each roller is the normal load which is dependent on the included angle formed between the work's rotation axis and points of contact at the rollers.

As a roller center distance is increased for a workpiece of given size, normal load on the roller increases as does rolling resistance. To keep the rolling resistance to a minimum, the center distance between rollers should be adjusted so the included angle remains approximately 45 deg. (See figure 4.)

A 60 deg included angle was once considered ideal, but a decrease in required horsepower of approximately 12% can be made merely by reducing the angle 15 deg. Optimum operating characteristics can be obtained with the 45 deg angle or less.

In any discussion of positioning and automation, ram manipulators must be included.

Consisting basically of a horizontal ram and a vertical lift, the manipulator can be used with any semiautomatic welding process. Using electronic drives and self-propelled travel carriages, and coupled with positioning equipment, automation is realized.

(For a reprint of this article, circle number 249 *on the Welding Info-Aid Card, page* 81.)

Should you switch to automatic arc welding?

PROPERLY ORGANIZED AUTOMATIC arc welding can result in high manhour output, low finishing costs and high uniformity with average operator skill.

Increased use of automatic arc welding is saving cash and time in a competitive market where quality requirements are high and labor costs are rising.

To realize the advantages of automatic welding, however, careful planning, design, and construction are necessary. Jigs and fixtures must be accurately and ruggedly made to hold the workpiece precisely and withstand operating strain and abuse.

Parts must be prepared to insure a high degree of uniformity and, most important, the proper automatic arc welding process must be chosen for each particular job.

There are several basic automatic arc welding processes. Be sure you know which one suits your needs when you consider automation.

Submerged arc welding is an automatic electric arc process using heat generated by electric current traveling from welding wire to workpiece through a high-resistance conductive granular flux.

This flux completely surrounds the welding wire tip so all welding takes place beneath the flux without an open visible arc and without sparks, spatter, smoke or flash. The process is distinguished by high-amp usage, high speed and a capacity to weld heavy metal thicknesses (16 gage to 2½ in.) in one pass.

In production, welding heads automatically deposit melt along the welding vee, feed welding wire into the welding zone and transmit current to the wire. Flux is supplied from a hopper mounted on the head or connected to the head by tubing.

Bare welding wire is fed into the welding head from a coil or rod mounted on a reel. Relative positions of the wire end and base metal are maintained at a constant by a special automatic control which turns any slight voltage variations in the weld into compensatory variations in the wire-feed motor.

Automatic submerged arc welding can be used for butt welds, fillet welds and plug welds in production and repair work and for rebuilding worn surfaces in addition to steel casting repair and staybolt welding.

It is also widely used for fabricating pipe, boilers, pressure vessels, railroad cars, ships, rotary kilns, kettles, machinery frames and parts, and structural shapes.

Using this process, a back-up is needed to make butt welds in one pass. A copper bar, copper shoe, or piece of steel (which will become part of

Automation; its limitations, its advantages

If you are considering a move to automatic welding, you should realize that automation has limitations in addition to advantages.

Here are points to consider before making a final decision:

1 — A large number of parts are necessary, or large numbers of uniform seams designed for automatic welding are required.

2 — A fairly large initial investment is required for automatic welding.

3 — Welding speed is increased. In some applications welding speeds of more than 100 ipm are obtained on production parts.

4 — The human element is greatly eliminated by automation, but automation can not take care of irregularities or variables that a skilled manual weldor can adjust for.

5 — In completely automatic setups, an operator needs much less training. Hence labor costs are lower.

6 — However, all automatic welding requires highly skilled technicians to establish welding conditions, set up procedures, and service the head and controls.

CO_2 flux cored Mig welder, made by National Cylinder Gas Div. of Chemetron Corp., Chicago, automatically welds components for new compact cars.

Automatic arc welding (continued)

the joint) may be used to prevent the molten metal from falling through.

Submerged arc automatic welding uses either a-c or d-c at 20 to 55 volts across the welding zone. By using various combinations of joint preparation, amperage, voltage and welding speed, the shape and reinforcement of the weld can be varied and fusion depth can be regulated as desired.

A-c is most frequently used for automatic submerged arc welding because installation costs and maintenance costs are usually lower. Special heavy-duty welding transformers with built-in motor-controlled reactors are also available.

Transformers are generally used in the 1,000-amp-capacity units. Higher current can be obtained by connecting units in parallel series.

The penetrating effect of the submerged welding arc can be drastically reduced by maintaining a welding action in which the current is electrically independent of the base material.

This action is accomplished in a specialized automatic submerged arc technique called series-arc welding. In this process, heat from the welding puddle fuses a thin layer of base material instead of a deep layer.

This is done by using two — or more — converging welding electrodes in a series so the current flows from one electrode to the other. The base work piece is electrically insulated from the power source instead of being grounded.

The welding current then flows from one electrode through the welding zone and back through the other electrode to the power source to complete the circuit. Location of the welding zone is adjusted by proper positioning of the electrodes to control the heat input to the base work piece.

The major advantages of the automatic series-arc technique are:

1 — It provides a convenient means of controlling penetration depth into base metal and so penetration depth may be reduced to a minimum.

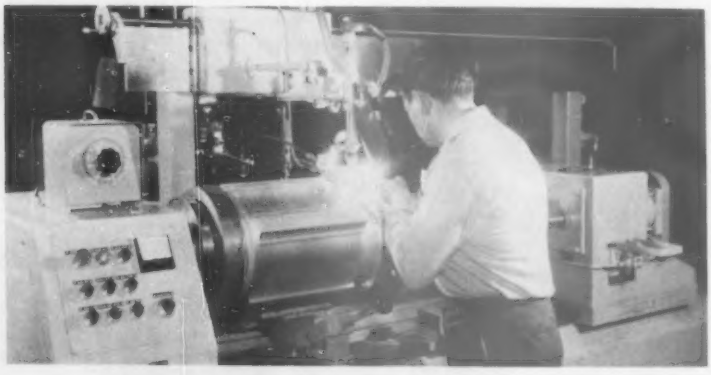
2 — Since weld-metal dilution can be readily maintained below 10%, production of high-quality clad steel structures may be accomplished economically at normal travel speeds.

3 — Wire melting rate is increased greatly since only a small amount of heat energy in the weld zone is consumed in melting base plate material.

4 — Heat application to base plate can be limited to make possible surfacing of thin-base metals and welding of joints where minimum base metal heating is desirable.

5 — For surfacing applications where high hardness is required, carbon retention in the deposited metal is much greater than in conventional methods.

In submerged arc automatic welding, two heads can also be run in tandem. The tandem arrangement is usually a three-phase operation used in deep-groove welding where high-deposit rate is required.



CENTER closure for liquid rocket engine is welded (left) with an automatic Tig unit made by Air Reduction Sales Co., New York City. A submerged arc automatic unit welds a 190-ft-diameter Hortonsphere (below) to house an atomic reactor. Workman at right is removing flux with a vacuum retriever. Opposite: automatic Mig welding cone and bottom section of an aluminum nuclear reactor tank at the A.P.V. Co. Works, Crawley, England.

In automatic fluxless Mig welding, a bare filler wire is melted in an inert arc atmosphere and transferred to the joint where the arc provides enough heat to fuse the metal surfaces.

In this automatic Mig process, a continuously-fed wire passes through a gun in which a contact area permits transfer of pre-selected current. The current causes the wire to melt at the precise rate at which it is fed.

Shielding gas — argon, helium, or a mixture of the two — is automatically fed from a nozzle to protect the welding zone.

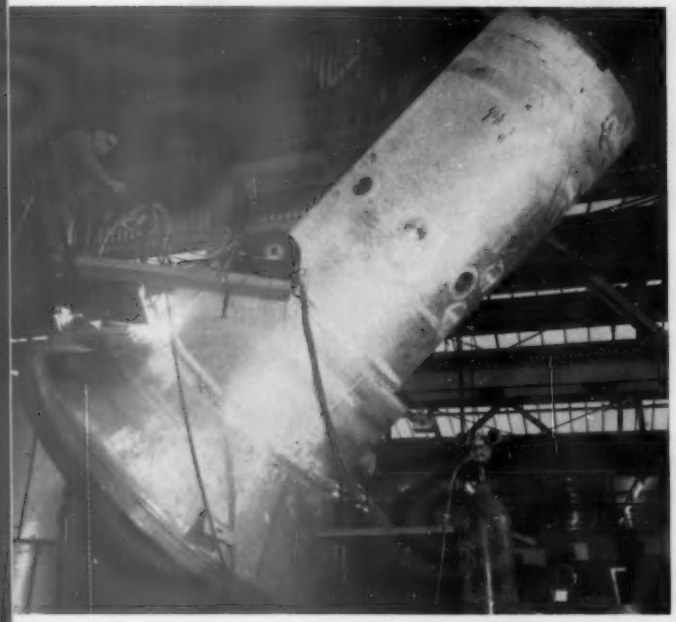
Advantages of the fluxless Mig process include: (1) contamination-free welds due to shielding gas; and (2) removal of surface oxide film on the work piece by the cleaning action associated with the reverse polarity d-c generally used for this process.

Several factors affect the selection of filler materials for automatic Mig welding. Most important is the selection of an alloy matching the base metal, but other factors should be considered including metallurgical control of grain size, segregation and wire size.

The process requires high arc current density conditions for successful operation. Wires may range from 0.002-in. to ⅛-in. diameter. The welding current range on the small diameter wires may be from 90 to 400 amp and can go as high as 800 amp for ⅛-in.-diameter wire.

As a result, current densities from 55,000 to 150,000 amp per sq in. of wire section are sometimes developed. Concentration of heat with this high current density facilitates rapid localized melting of base metal and results in less distortion and a high metal deposition rate.

Automatic Mig welding originally found its most ready application in the non-ferrous field, particularly on aluminum and magnesium alloys. But it is also used today on mild and low alloy steel.



Automatic Mig welding is also done with carbon dioxide as shielding gas. This process is employed primarily for welding steel. A prime advantage of CO_2 shielding is the soundness of the deposited metal, providing filler wire containing balanced deoxidizers is used.

Automation overcomes the tendency of the carbon dioxide shielding arc to be wild and spattery by maintaining a short, uniform arc length. This results in higher welding speeds, better weld penetration, and sound welding characteristics combined with lower cost.

In some cases, a gas-evolving flux material is used to supplement CO_2 shielding.

In the *flux-cored* CO_2 process, the wire is composed of a central flux core surrounded by a metal sheath.

In the *flux-coated* CO_2 process, the gas transports a magnetic flux which is fed magnetically to the wire.

In both of these processes, the fluxed wire has the advantage of improving arc action and providing slag to cover the molten deposit.

Automatic flux-core welding is also being done without shielding gas of any kind. In this process, the wire is automatically fed to the work piece, and the arc is visible.

Advantages claimed for this flux-cored automatic welding are high welding speed and complete absence of any type of externally-introduced shielding or fluxing material.

Automatic Tig welding is a fluxless arc process which, like Mig, uses an inert gas to protect the weld zone from the atmosphere. However, in Tig welding, heat is provided by a non-consumed tungsten electrode.

If filler metal is required, it is fed automatically into the weld zone and melted with the base metal. With Tig, best results are obtained when welds have the same metallurgical, chemical and physical properties as the base metal itself.

To obtain such conditions, the molten weld puddle must be protected from the atmosphere during the welding operation. Otherwise, atmospheric oxygen and nitrogen will combine with the molten metal and result in a weak porous weld.

Either argon or helium may be used for Tig shielding though argon is recommended because of its general suitability for a wide variety of metals and for much lower flow rates required.

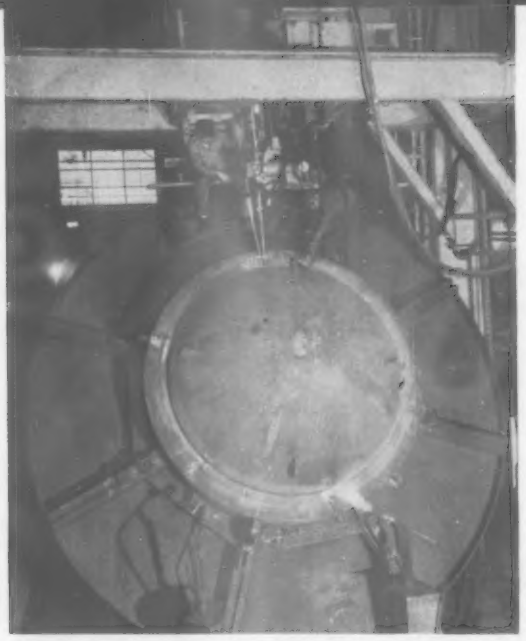
Two additional automatic processes recently introduced in this country are electroslag and electrogas welding. Electroslag involves fusion of base metal and continuous fed filler wires under a substantial layer of high temperature electrically conductive molten flux. Electrogas welding is a CO_2 shielded flux-cored wire counterpart of the electroslag process. This process is generally used for welding thinner materials: ⅜ to 1½ in.

(*For a reprint of this article, circle number* 250 *on the Welding Info-Aid Card, page* 81).

On the job

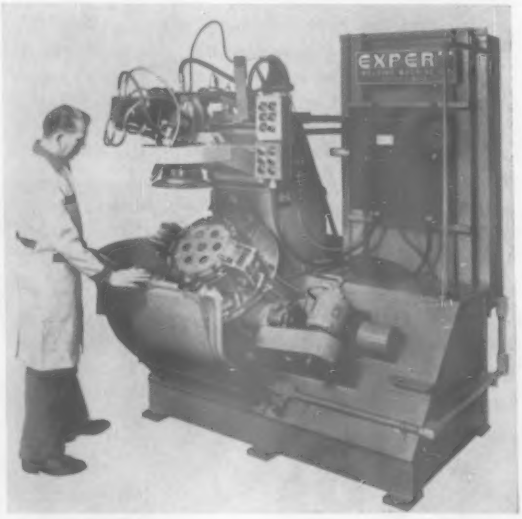
Automatic welding— from tiny transistors to massive forgings

Fully automatic welders are now joining everything from mammoth six-ton forgings for nuclear reactor pressure vessels to miniature power transistors. Mig, Tig, submerged arc, brazing and other processes are automatically fabricating products with less manpower and greater speed.



Submerged arc

SIX-TON flange forging is automatically submerged arc welded to head for nuclear reactor pressure vessel on 14-ton positioning table by Allis-Chalmers Mfg. Co., Milwaukee.



CO_2-Mig

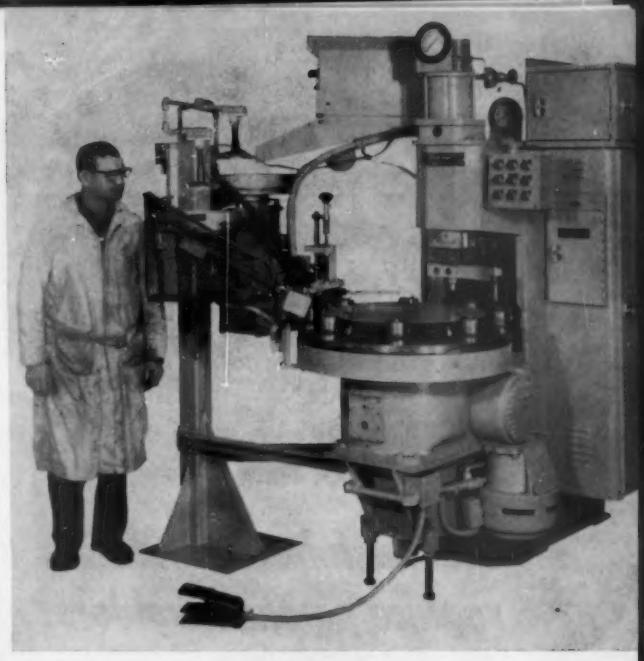
SINGLE-STATION automatic rotary welder joins gear ring to a hub in fabricating flywheel assemblies. Welder, made by Expert Welding Machine Co., Detroit, has a 171-flywheel-per-hr production rate.

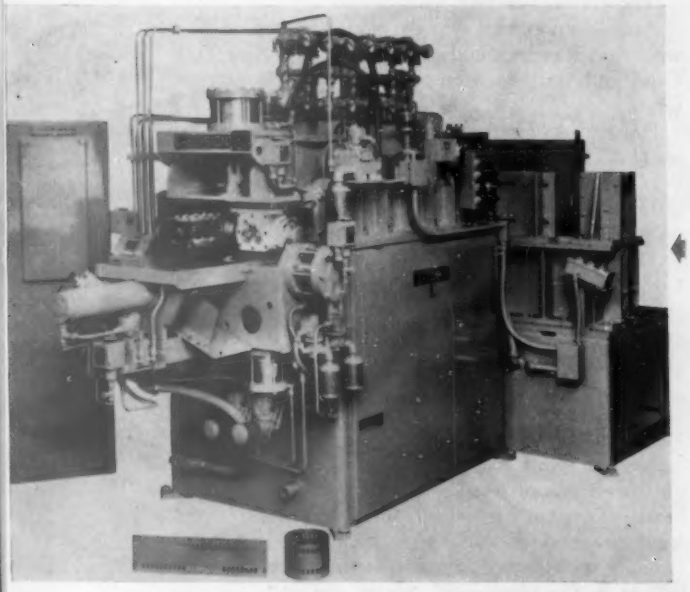
Mig

END CLOSURES of liquid rocket-engines are fabricated with Mig equipment mounted on a specially-designed automatic assembly. Welder was made for Thiokol Chemical Corp., Bristol, Pa., by Air Reduction Sales Co., New York City.

Projection

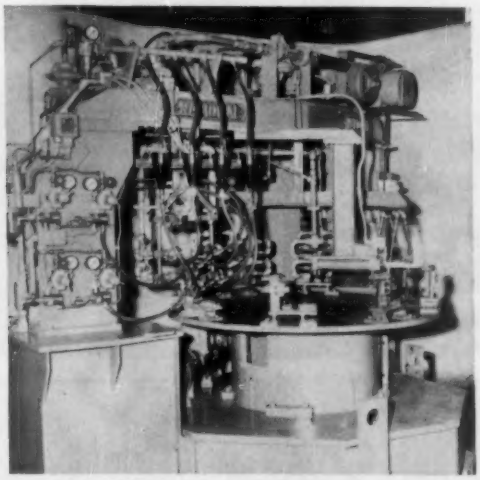
EIGHT-STATION dial-feed unit is complete with hopper feeds for automatic projection welding of power transistors. Made by The Federal Machine and Welder Co., Warren, Ohio, the welder is motor driven, toggle operated for slide travel with pressure developed through an air cushion cylinder used as a backup.





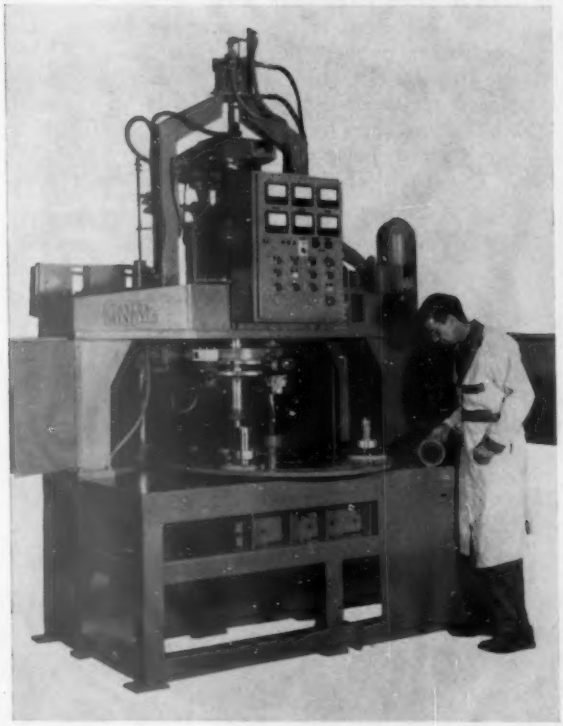
Resistance

MOTOR-SHELL welder automatically takes stack of slotted steel blanks, rolls them into cylinders, welds them to exact circumference, and ejects them at rate of 420 per hr. Anti-friction head mash-welds the seam in this welder built by Precision Welder and Flexopress Corp., Cincinnati.



Brazing

AUTOMATIC eight-station dial feed brazer is reported to produce 300 units an hour. Machine, made by National Electric Welding Machines Co., Bay City, Mich., is designed to assemble an accelerator linkage consisting of two levers and a rod.



Tig

STACKS of laminations for electric motor stators are loaded on expanding mandrels of this automatic rotary index welder as three Tig units join edges of another clamped stack. Welder, made by The Taylor Winfield Corp., Warren, Ohio, can be adjusted to automatically index welding heads for a second pass.

Automatic girth welding of small diameter aluminum pipe was introduced about two years ago. Now, automated systems for joining large diameter steel pipe in the field are being hailed as "revolutionary developments." Nevertheless, some observers remain skeptical — not about the equipment, but about its industry-wide acceptance.

Will push-button welding replace pipeline weldors?

by F. T. Tancula . . . *Editor*

ONE AREA IN WHICH AUTOMATION has made comparatively little headway is pipeline welding.

But several firms have staked years of research and large amounts of cash that this picture soon will change.

ABOVE: Line pipe 36 in. in diameter is joined by Hobart system. RIGHT: Close-up shows head nearing 6 o'clock.

LEFT: Airco machine lays pass at 45 imp. Both systems use Mig with CO_2 shield.

Previous automation efforts in the field (other than those on aluminum pipe) have stopped at double-jointing — welding two 40-ft lengths of steel pipe automatically by the submerged-arc process into 80-ft. sections.

But fully automatic — and portable — equipment for making all field joints in steel pipe up to 36 in. in diameter now has been developed by three welding-equipment manufacturers — Air Reduction Sales Co. and Linde Co., both of New York City, and Hobart Brothers Co., Troy, Ohio.

The companies had help.

Airco's equipment was developed in conjunction with Esso Research and Engineering Co., New York City, and Battelle Memorial Institute, Columbus, Ohio.

Hobart reports that its machine "was developed by H. C. Price Co., Bartlesville, Okla., in cooperation with Crose-Perrault Equipment Corp., Tulsa."

Linde, which up to now has shown its device only to representatives from the pipeline industry, worked for more than two years with Bechtel Corp., San Francisco. Although we were not shown Linde's equipment, we can guess that it employs the Mig welding process, as do Airco's and Hobart's.

The Airco machine was described at length in WELDING ENGINEER, April, p. 66. Basically, it employs a rotary carriage on which is mounted an air-driven abrasive cutting wheel and a welding head. The cutting wheel slices a minute sliver from the end of each pipe, and the Mig head (usually with carbon dioxide as the shielding gas) follows in the same path, joining the ends.

Airco says more than $500,000 and over three years were spent in developing the process. The equipment publicly demonstrated at the Union, N. J., plant during the recent welding show is designed for welding pipe up to 8 in. in diameter. Similar machines for pipe up to 36 in. in diameter are planned, however.

The Airco pipeline welder is being made avail-

able to contractors on a lease basis.

The Hobart equipment employs the firm's Micro-Wire process, a system described in length in WELDING ENGINEER, October, p. 36. Basically, it is a carbon-dioxide shielded method using a small diameter electrode wire (from 0.035 to 0.045 in.), low arc voltage (from 19 to 20 volts) and a relatively low current (from 120 to 150 amp, d-c, reverse polarity).

Field tests on pipeline projects in Oklahoma and California have shown that the machine will automatically join 36-in. diameter pipe of 7/16-in. wall thickness in less than eight minutes. No cleaning or grinding is necessary, Hobart reports.

The machine is lightweight and compact. It can be positioned over the joint by two men, but for field operations, it is positioned by a side-boom tractor.

All welding is downhill, starting at 12 o'clock and welding to 6 o'clock on both sides of the pipe. The second bead overlaps the first at both top and bottom. Welding speeds depend upon wall thickness.

In both the Airco and Hobart systems, pipe ends are lined up and held together externally by the machine and internally by expanding line-up clamps. It is safe to assume that the Linde machine is similar in this respect.

The Linde apparatus is presently undergoing field trials on steel pipe up to 36 in. wide. The large unit weighs about 700 lb, and it, too, moves around the pipe, depositing weld metal automatically.

Further information has not been revealed by the firm but photographs and trial results are expected to be made public in a month or two.

What about the root pass?

Normally, even in automatic pipe welding, backing rings must be used for the initial pass. Or it is laid manually or semiautomatically (often by the Tig process).

The new machines described here are obviously capable of laying a root pass automatically without need for a backing ring. Airco spokesmen have pointed this out in respect to their new pipeline welder. Hobart has long claimed this as a chief advantage of its Micro-Wire process.

Nevertheless, it is believed some contractors still will insist that the root pass on heavier wall pipe be laid manually or semiautomatically.

How soon will push-button welding displace a large number of pipeline weldors? Or will it displace them at all? Difficult questions that will be answered only by pipeline contractors themselves. They must use the equipment — and make it work effectively and economically.

But more than one observer has expressed doubt that contractors (although instrumental in developing automatic systems) are ready to proceed at full speed in the direction of complete welding automation.

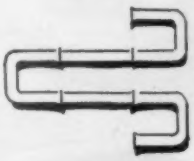
We'll just have to wait and see.

GOT A JOINING PROBLEM?

Having trouble with corrosion? Dissimilar or unusual metals? Successive joints on the same work? We'll tackle it... at no cost to you.

Tough joining problems gave this company its start. Every time we solved a problem we had a new customer... and often a new product to sell! That's how we got into the special alloys business in 1946. That's how we grew.

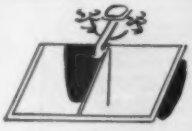
FOR EXAMPLE



Automobile air conditioning units called for a low-cost but highly corrosion resistant heat exchanger with freon-tight seals in aluminum tubing. ALL-STATE developed a cadmium-zinc alloy that was low in cost, resistant to all atmospheric conditions, and leak-proof. Same alloy now used for repair of automobile radiators.

Our 430° non-acid flux was developed for joining stainless with minimum hazard to users. A subsequently discovered application was joining Hydro T-metal without discoloration.

It took months to figure out how to braze the cathode wire to the terminal inside radio vacuum tubes without blackening the inside of the tube. Our silver-copper-indium alloy lowered brazing temperature without increasing vaporization rate, solved the problem.



Stainless steel kitchen sinks became economically feasible only after we helped a manufacturer solve the problem of a perfect color match with a monel gas welding rod.

We still like tough joining problems. That's why we invite you to put your joining problem up to us. We may fail or succeed, but we'll work on it with the best research brains and equipment, and it won't cost you a penny.

Write and tell us what your joining problem is, with the essential details.

Send for a free copy of our 56-page Manual and Catalog.

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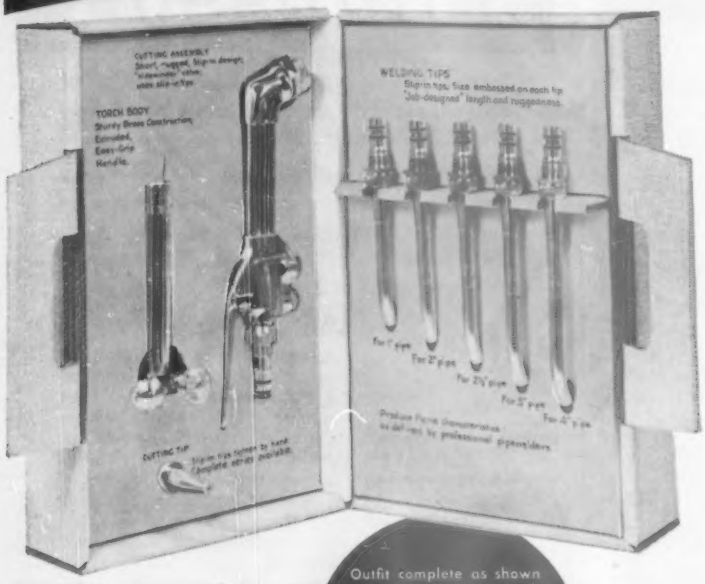


The Combination Outfit Designed by Pipewelders For Pipewelders!

Two years ago we retained a staff of professional pipewelders to tell us what features they needed in an outfit. One that would best perform the special jobs of the trade. We've been working closely with them since then . . .

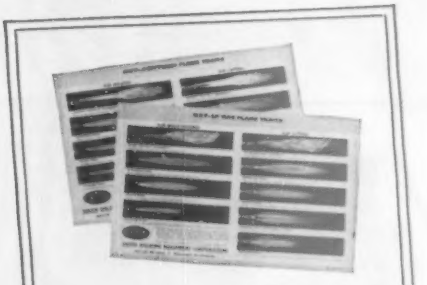
Now here's the outfit . . . "job-designed" and field tested during a full year and a half of on-the-job performance. It's a precision tool, yet ruggedly durable. Great for new construction or maintenance:

"Special" Outfit	List Prices
PW1 Torch Body	21.00
PW306 Weld Tip	5.00
PW307 Weld Tip	5.00
PW308 Weld Tip	5.00
PW309 Weld Tip	5.00
PW310 Weld Tip	5.50
PC605 Cut. Assy.	36.50
SC1-6 Cut. Tip	4.25
Total	87.25

Outfit complete as shown

$74.50

- **WELDING TIPS**—tips slip-in and nut hand tightens, hex also provided on nut; tip rotates 360°. Short design with rugged copper section; precision flame stability. Recommended pipe size embossed on each of 5 tips.
- **TORCH BODY**—extruded "easy-grip" handle with brass forged butt; ball-type needle valves. Available in two lengths for operator preference.
- **CUTTING ASSEMBLY**—Slips into torch body, nut hand tightens; lever flips up for unrestricted access to nut; 75 or 90 degree head available.
- **CUTTING TIP**—Slips in, head nut hand-tightens. Complete series available.



New! 4-color wall charts showing flame traits of oxy-acetylene and oxy-LP gas in cutting, welding and brazing. Yours for the asking. See your Smith distributor or write Smith's.

Your Smith distributor has it in stock now . . . and if you like its looks and performance, you can buy it at a most attractive price.

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Special New Products

Positioning device has 3-in. to 40-in. capacity

Standard size of three-jaw self-centering positioner has 3-in. to 40-in. capacity with larger and smaller sizes available on special order. Designed for welding and flame hardening, the unit's hardened steel jaws open and close with a turn of a wrench and automatically center work. Holding device mounts on headstock, turntable, or positioner, and can be fitted with special jaws for special applications. Heavy-duty chuck is sealed against dirt and abrasive matter. **Skinner-Horton Chuck Div.**

Circle No. 37 on Info-Aid Card.

Bench model positioner has 100-lb capacity

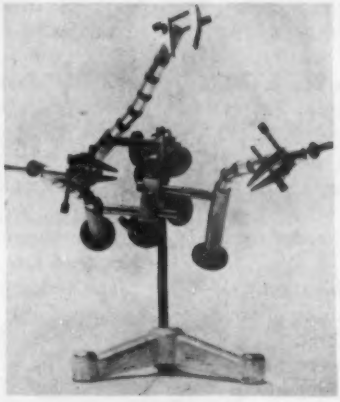
Bench model positioner with 100-lb capacity tilts any load up to 100 lb through full 135-deg range. Rotates load at any speed up to 6 rpm. Weighs 65 lb, can be mounted on bench or pedestal. Power rotation has variable voltage for stepless variable drive and is controlled by foot switch. Remote control optional; 14-in. diameter table with hollow spindle has four tee slots at right angles for easy work attachment and chanels under slots to catch foreign matter. **The Ransome Co.**

Circle No. 38 on Info-Aid Card.

Annealing system designed for green wire flash welding

Annealing system features circuitry arrangement that automatically applies post heat to flash welds in green wire for appropriate time interval. Circuitry also permits accurate annealing temperature regulation by means of pyrometer and manual feedback system. Applied to joint in green, high-carbon wire, annealing operation produces weld characteristics reportedly identical to or better than parent metal. Annealing system complements F-1 30-kva welding wire machines capable of flash welding high carbon wire ¼-in., 9/32-in., ⅜-in. and 9/16-in. diameter. **Thomson Electric Welder Co.**

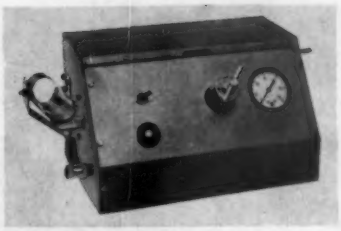
Circle No. 39 on Info-Aid Card.



Positioning fixture features three-arm design

Robot-Vise consists of one to three arms adjustably mounted on one-foot upright. Each arm terminates in clamp that can be adjusted to any position and immediately tightened by a single knob to bear up to 10 lb. Flexibility of arms and crosspieces permits components to be positioned in any three-dimensional relationship and allows whole assembly to be rotated on any of three axes for further operation. **Norman Epstein.**

Circle No. 40 on Info-Aid Card.



Automatic control unit conserves inert gases

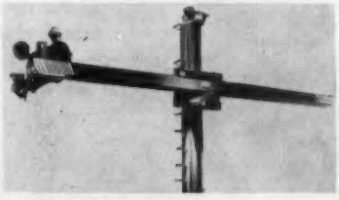
Automatic gas and power control unit conserves inert gases such as nitrogen. Inert gases used to prevent oxidation during welding of polyethyelene and polypropylene plastic are controlled by regulator and gage. Built-in pressure switch automatically shuts entire unit when gas pressure falls below safe level. **Laramy Products Co.**

Circle No. 41 on Info-Aid Card.

Valves designed for jig positioning, clamping

Miniature directional valves are for oil hydraulic systems. Designed for use in small volume systems typically used for jig positioning and clamping. Suitable for operation to 1,000 psi and have maximum capacity of 2 gpm. Simple long-life solenoids with low current consumption are available in all standard voltages. **Vickers, Inc.**

Circle No. 42 on Info-Aid Card.



Manipulators feature convex, concave tracking

UMB manipulators feature concave and convex tracking. **UPC-B series** offers positioners with overhead beam and variable speed carriage. Turning roll line has been re-rated because of larger bearings, greater hp, and more efficient gearing. **Unique Equipment, Inc.**

Circle No. 43 on Info-Aid Card.

Automatic fabric welder gives 70 strokes per minute

Automatic welder for producing fencing, utility fabric, concrete reinforcement and light paving mesh has working range of 2 to 12-in. spacing on 4 to 10-gage wire. Maximum mat width is 8 ft. Production rate is 70 strokes per minute. Automatic line consists of wire straightener, welder, trimmer, slitter, indexing device and coil winding reel. Single head welder is fitted with 50 welding guns, coupled in series to 25 15-kva transformers. Welded fabric is coiled on divided mandrill with 36-in. coil diameter capacity. **National Electric Welding Machines Co.**

Circle No. 44 on Info-Aid Card.

by Howard B. Cary
Hobart Brothers Co.

NOW—one welder for six semiautomatic processes

SIX welding guns and cable assemblies (left) are capable of being used with as many semiautomatic welding processes thanks to a new combination welder and matched wire feeder (above).

SEMIAUTOMATIC processes offer a great potential savings in welding operations because of their efficiency and higher deposition rates.

However, with each new process, a new welding machine and wire feeder has been introduced.

In most cases the welder and feeder are applicable only to a single specific process, and in many cases, only to one current range employing the new process.

Why not a single welder and wire feeder for all these semiautomatic processes?

Hobart's Multi-Wire welder, a combination welder and matched wire feeder with a family of welding guns for each process, is such a unit.

The proper welding gun and cable assembly with appropriate drive rolls and wire guides makes the machine applicable for:

(1)—**Small-diameter wire, CO_2 shielded welding.**

(2)—**Large-diameter wire, CO_2 shielded welding.**

(3)—**Combination tubular or fluxed wire and CO_2 shielded welding for steel.**

(4)—**Mig welding of non-ferrous metals, especially aluminum.**

(5)—**Fabricated or tubular wire welding without gas shielding.**

(6)—**Submerged-arc welding.**

The unit consists of a motor generator power source, a wire feeder and control circuit, a water cooling system, and a wheel-mounted truck — plus the gun and cable assemblies.

One dial controls the output voltage from a minimum of 3 volts to a maximum of 48 volts. Several taps provide for different volt ampere output slopes.

One tap has a maximum droop of approximately 15 volts at full rated current. Another tap with minimum droop provides a voltage drop of 3 volts at full rated current.

The volt-amp slopes are factory preset and normally do not require change for any of the currently known semiautomatic arc welding processes. The generator is rated at 500 amp, d-c, at 40 volts with a 100% duty cycle, or 650 amp at a 60% duty cycle.

The wire feeder utilizes the constant voltage type welding current control. A single dial sets wire feed rate and, thus, the welding current.

The welding head feeds wire by means of a ¼-hp, d-c shunt motor and gearbox, and a four roll drive system for positive traction. Control is by an auto transformer and dry disc rectifiers.

Several gearboxes are used, but it is not necessary to change gearboxes unless changing from extremely high burn-off rate wire to extremely low burn-off type.

The cooling system uses a minimum amount of water but has a high cooling capacity. The tank-housed pump can be plugged into the welder front and used without special plumbing.

Each gun and cable assembly is specifically designed for a particular semiautomatic process. Each will accommodate a variety of wire sizes within the normal rated range of the gun by using various sized contact tubes and liners.

HUSKY to handle Petroleum Molecules

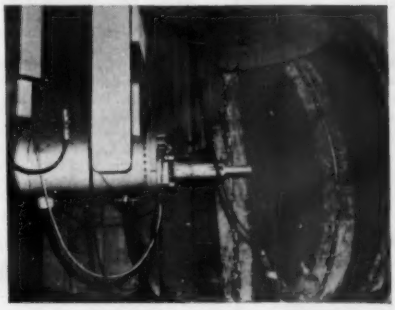
Hortonclad spherical reactor for a petroleum catalytic reforming unit.

Welded Hortonclad spherical reactor for oil company catalytic reforming unit works under very high pressures. Chicago Bridge and Iron Company uses radiography to prove every seam sound.

STURDY STUFF, this husky refinery unit. Seventeen feet in diameter, made of 3.65-inch-thick Hortonclad plate composed of ¼-inch 405 stainless steel on carbon steel. Seams between segments and end covers are welded—then radiographed to check for complete, continuous fusion.

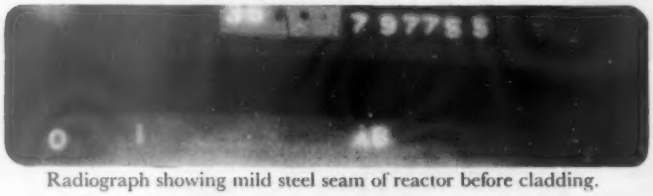
Welding is steadily taking on bigger and more important jobs and radiography is providing the proof of quality. If you would like to learn how radiography can save you time and help build business, have a talk with an x-ray dealer or write us for a Kodak Technical Representative to call.

Technician positions Kodak Industrial X-ray Film, Type AA.



2-million-volt x-ray unit set to radiograph intermediate seams.

Roundabout seam is radiographed with 50-curie pill of Cobalt 60.



Radiograph showing mild steel seam of reactor before cladding.

Now . . . Ready Pack in ROLLS and SHEETS Kodak Industrial X-ray Film, Types AA and M in 200-ft. rolls (16mm, 35mm, 70mm) and sheets (8 x 10, 10 x 12, 11 x 14, 14 x 17).

- No darkroom loading—film sealed in a light-tight envelope.
- Just place Ready Pack in position and expose.
- Film protected from dust, dirt, light and moisture.
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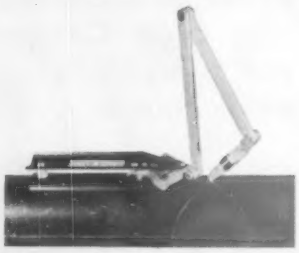
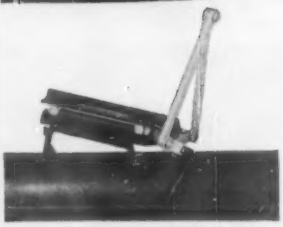
CURV-O-MARK

Contour Marker



Marks off any pipe joint or structural angle cut accurately, easily and without figuring cutbacks. Contour Markers mark all around pipe — save both time and gas. Available in 2 sizes of 1½" to 18" in cross-section, 16" to 48" diameter.

Combination Adaptor

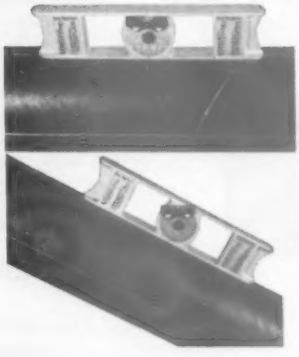


FOR CONTOUR MARKER

Adaptor allows layman to use all sides of Contour Marker in layouts on pipe and structural steel. Standard model marks up to 30" pipe, without having to quarter or halve. Marks over surface irregularities and old welds, and without having to break wrap so far back on wrapped pipe. Compound angles can be marked in one setting of tool; also, any portion of tube turns or 90°. The combination adaptor also furnished for the Jumbo Marker on special order.

Pro-Mag-Level

Pocket size and equipped with two magnets on each plane for holding level in position. One side is machined flat for flat work, and the other, to a slight V-plane for pipe. Besides level, Pro-Mag-Level is equipped with 90° dial marked in 2½° increments and scales for rise in degree per foot or meter. Frame made of strong cast aluminum.



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WE's List of Manufacturers

AUTOMATIC WELDING EQUIPMENT

Acro Welder Mfg. Co., Milwaukee, Wis.
Air Reduction Sales Co., New York, N. Y.
Airline Welding & Engineering, Gardena, Calif.
Allied Welder Corp., Dearborn, Mich.
Arcos Corp., Philadelphia, Pa.
Automatic Welding Co., Waukesha, Wis.
Automation Machines & Equipt. Co., Inc., Milwaukee, Wis.
Bernard Welding Equipment Co., Chicago, Ill.
Delta Welder Corp., Detroit, Mich.
Dix Engineering Co., Inc., Lincoln Park, Mich.
Eisler Engineering Co., Inc., Newark, N. J.
Expert Welding Machine Co., Detroit, Mich.
Glenn Pacific Power Supply Corp., Oakland, Calif.
Hobart Bros. Co., Troy, Ohio
Lincoln Electric Co., Cleveland, Ohio
Linde Co., New York, N. Y.
Mid-States Welder Mfg. Co., Chicago, Ill.
Miller Electric Mfg. Co., Inc., Appleton, Wis.
National Cylinder Gas Div., Chicago, Ill.
Reid-Avery Co., Baltimore, Md.
Resistance Welder Corp., Bay City, Mich.
Rexarc, Inc., West Alexandria, Ohio
Smith, A. O., Corp., Milwaukee, Wis.
Stahl Equipment Co., Brookline, Mass.
Stoody Co., Whittier, Calif.
Taylor-Winfield Corp., Warren, Ohio
Webb Corp., Webb City, Mo.
Weltronic Co., Detroit, Mich.
Westinghouse Electric Corp., Buffalo, N. Y.
World Electric Co., Cleveland, Ohio

MANIPULATORS

Airline Welding & Engineering, Gardena, Calif.
Aronson Machine Co., Arcade, N. Y.
Automatic Welding Co., Waukesha, Wis.
Banner Mfg. Co., Milwaukee, Wis.
Bentley Weldery, Inc., Syracuse, N. Y.
Berkeley Co., Danville, Ill.
Berkeley-Davis, Inc., Danville, Ill.
Cayuga Machine & Fabricating Co., Inc., Depew, N. Y.
Eisler Engineering Co., Inc., Newark, N. J.
Herrick, C. B., Mfg., Corp., Cleveland, Ohio
Lewis Welding & Engineering Corp., Bedford, Ohio
Miami Specialties Co., Troy, Ohio
Morton Mfg. Co., Muskegon Heights, Mich.
Multi-Hydromatic Welding & Mfg. Co., Detroit, Mich.
Pandjiris Weldment Co., St. Louis, Mo.
Peck, Cecil C., Co., Cleveland, Ohio
Progressive Welder & Machine Co., Detroit, Mich.
Ransome Co., Scotch Plains, N. J.
Resistance Welder Corp., Detroit, Mich.
Sciaky Bros., Inc., Chicago, Ill.
Stahl Equipment Co., Brookline, Mass.
Unique Equipment, Inc., Brooklyn, N. Y.
Victor Equipment Co., San Francisco, Calif.
Webb Corp., Webb City, Mo.
Welding Machines Mfg. Co., Detroit, Mich.
World Electric Co., Cleveland, Ohio

POSITIONERS

Acme Mfg. Co., Detroit, Mich.
Acro Welder Mfg. Co., Milwaukee, Wis.
Airline Welding & Engineering, Gardena, Calif.
Aronson Machine Co., Arcade, N. Y.
Be-Co Engineering Co., Rosemead, Calif.
Bentley Weldery, Inc., Syracuse, N. Y.
Boesch Mfg. Co., Inc., Danbury, Conn.
Cayuga Machine & Fabricating Co., Inc., Depew, N. Y.
Eisler Engineering Co., Inc., Newark, N. J.
Epstein, Norman, Co., Carmel, N. Y.
Grand Specialties Co., Chicago, Ill.
Herrick, C. B., Mfg. Corp., Cleveland, Ohio
Harnischfeger Corp., Milwaukee, Wis.
Lewis Welding & Engineering Corp., Bedford, Ohio
Miami Specialties Co., Troy, Ohio
Pandjiris Weldment Co., St. Louis, Mo.
Peck, Cecil C., Co., Cleveland, Ohio
Raco Engineering Service, Alhambra, Calif.
Ransome Co., Scotch Plains, N. J.
Sciaky Bros., Inc., Chicago, Ill.
Stahl Equipment Co., Brookline, Mass.
Stoody Co., Whittier, Calif.
Superior Welding Co., Los Angeles, Calif.
Unique Equipment, Inc., Brooklyn, N. Y.
Webb Corp., Webb City, Mo.
Weldma Co., West Hartford, Conn.
World Electric Co., Cleveland, Ohio

Why shout?

We don't make fancy claims, just good electrodes. We take great care in making them. We make all kinds, too.

All we ask is that you try a box. We think you'll be pleased with the way they weld. BUT: If they aren't — in your honest opinion — as good or better than any electrode you've used, bring back the box and we'll give you back your money.

Square deal?

HARNISCHFEGER
Milwaukee 46, Wisconsin

P&H
WELDING PRODUCTS DIVISION

WELD nugget (1) *joins* 0.004-*in. thick stainless layer to on* 0.064 *in. thick. Technician* (2) *is welding strips of stainless varying in thickness from* 0.001 *in. to* 0.010 *in. to block of type* 321 *stainless steel. Closeup* (3) *reveals details.*

Space age requirements spur resistance welding innovation

A RESISTANCE-WELDING method which permits sound joining of ultra-thin materials to thick is now in production use at Ryan Aeronautical Co., San Diego.

The Ryan innovation is particularly suited for welding thin sheet metal up to 0.016 in. to plates of considerable thickness—specifically, pieces whose thickness ratio exceeds 4 to 1.

Normally, the weld nugget forms within the thick material instead of equally at the interface of two materials of dissimilar thicknesses. The result: a weak, unsatisfactory joint.

Three Ryan welding engineers, John R. Fullerton, Laurence E. Leech and Donald L. Heyser, developed the new system which produces a uniformly accurate and securely bonded structure. And the system is simple, safe and convenient to use, according to Ryan.

The main factors employed in the process are:

(1) Applying a welding electrode under heavy unit pressure at the spot to be joined;

(2) Shooting a heavy pulse of current to the electrode; and

(3) Continuing electrode contact pressure until the weld nugget is sufficiently cooled.

Welding apparatus is comparatively simple. It consists of a power supply, timing mechanism and a pressure system. The power source is connected to opposite ends of the primary winding of a transformer.

A timer connected to the power source discharges through the primary winding of the welding transformer. The secondary winding is connected at one end to the welding electrode. The other end is either grounded to the welding table or attached to the thicker material.

A wheel-type electrode is best suited for this process. With constant pressure applied to the point of weld, the wheel rolls along the surface of the thin material, producing a row of spaced spot welds. (Other types of pressure contact electrodes may be used, provided pressure can be controlled accurately.)

The timer controls both power and pressure precisely. Timing varies according to material and type of welding.

When the current is released through the primary winding, it causes a pulse of welding current to flow in the secondary winding. The transformer then shoots a heavy current flow at low voltage through the electrode held on the work surface. A current of 40,000 amp at 2 volts has been used satisfactorily at Ryan.

Electrode contact pressure also controls interface resistance of both materials to a considerable

Space age . . .

degree (the greater the pressure, the lower the contact resistance). Thus, control of pressure is vital.

The critical factor is the surface resistance at contacting faces of the metals. Electrode pressure is set in relation to other factors controlling interface resistance. Thus, interface resistance represents virtually the entire resistance to the welding current. Since surface finish of thin sheet metal generally is smooth and carefully controlled, the interface resistance can be made nearly constant.

When welding current is applied, the greatest heat build-up is at the interface of the metals, and the weld nugget forms equally at contacting faces.

Rapid quenching encountered in welding foil gages necessitates an accurately controlled follow-up of the pressure system to prevent cracking and expulsion.

Because total quantity of heat involved is small and concentrated, radiation and conduction losses are minor. The weld nugget solidifies almost immediately, yet not before the electrode pressure is removed nor before satisfactory forging action is completed.

Also, with extremely thin materials used, the size of each nugget is small, and surface distortion of metals due to follow-up pressure is negligible.

With a wheel electrode advancing as much as 15 ipm and making 10 welds per inch, it has been found that electrode pressure is maintained long enough to avoid cavitation. In methods using longer weld periods, excess heat is generated in the weld area, and the weld cools more slowly. This makes it impractical to maintain complete follow-up pressure in fast, repetitive welding.

Ryan, in conjunction with the three engineers, has applied for a patent on the system. The company feels the innovation takes on added importance in light of space-age requirements for joining thin metals to thick.

ALL THIS and NO EXTRA COST! Why settle for LESS?

Helmet QUALITY is FIBRE-METAL'S Trademark!

CHECK ALL THESE FEATURES FOR PROOF!

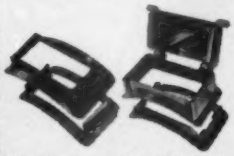
OVERHEAD ADJUSTMENT to raise or lower crown as needed...with 6-position positive lock. Easy to adjust.
PLASTIC MATERIAL: a) unaffected by moisture, hence no warping; b) conforms easily to all head shapes; c) easy to keep clean, to sterilize ...unaffected by detergents.
NEW RATCHET ADJUSTMENT holds selected size. Designed for gloved hand. Based on Fibre-Metal design used dependably for many years. Widest headsize range!
ALL METAL PARTS ALUMINUM for light weight, durability, corrosion resistance (except necessary bronze and cadmium plated steel springs).
FREE-FLOATING ATTACHMENT permits headgear headband to fit all head shapes perfectly. No side helmet shell pressure on wide heads. No front-to-back pressure on narrow heads. There is no direct connection of headband to helmet shell!
REPLACEABLE SWEATBANDS (snap buttoned!) of supremely comfortable Genuine Leather (also in simulated leather). Smooth overlap construction, no annoying wrinkles, padded.
WIDE RANGE FRICTION JOINT. Long lasting, holds helmet up easily, needing only slight nod to return to operating position. Easy to adjust.
CHIN REST is adjustable to 3 positions . . . a real comfort feature, particularly for overhead welding. Also supports helmet shell for longer service life.
4-POSITION HELMET STOP positions helmet for overhead and vertical welding. Easy, positive, no tools required. Allows normal raising of helmet on friction joints.

THE WELDING HELMET WITH THE WORLD'S MOST COMFORTABLE HEADGEAR!

More than 60 styles of helmets to meet all your needs

Check overall...and check detail after detail... and you'll see REAL SUPERIOR QUALITY by any comparison! These features *give you the best ...the most for your money!* In value, in comfort, in convenience, in wide versatility of usefulness!

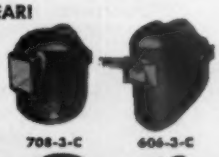
MANY TYPES OF GLASS-HOLDERS, fixed or lift-front, of plastic, steel or Dowmetal. Rugged, light, durable ...and insulated from outside to inside. Leak-proof to light! All glassholder models replaceable for longer helmet life.



QUICK-LOK-equipped Helmet shells are available in all popular styles. Provides quick and easy shell attachment to Safety Caps or the new 3-Q Headgear!

Ask Your Welding & Safety Distributor!
Bulletin No. 73 gives you complete helmet and accessory information.

FIBERGLAS* Welding Helmets



FIBERGLAS shells are seamless, completely opaque†, compression molded of Fiberglas-reinforced thermosetting polyester resin. With strengthening beaded edges, they are rugged, self-extinguishing, impervious to moisture, easily cleaned and sterilized, allow full ventilation.

VULCANIZED FIBRE Helmets

Vulcanized Fibre Shells, seamless and fabricated, are LOWER PRICED, light in weight, "sealed" against light leakage, allow full ventilation. Other features as above!

*Owens-Corning Trademark
†Even when non-reflective inside coating is scratched!

The FIBRE-METAL Products Company | CHESTER PENNA

In CANADA: Fibre-Metal (Canada) Limited, Toronto

For more facts Circle No. 182 on Welding Info-Aid Card

RENAMING Times Square to Welding Square during the AWS convention is President-elect A. F. Chouinard, assisted by Miss Sally Kemp, star of the Broadway show "Advise and Consent."

AWS Welding Show attendance sets a new record

THE 42ND ANNUAL AWS Meeting and Welding Show in New York City proved to be the most successful ever held.

The 19,000 clocked-attendance at the welding exhibition far surpassed the 11,250 set at Philadelphia in 1957, and the 129 exhibitors were only three shy of the record set last year at Los Angeles. Registration for the technical sessions reached a total of 1,700.

Out-going president R. D. Thomas, Jr., opened the annual meeting on Monday morning by stressing the importance of American participation in the International Institute of Welding.

"American isolation, both political and technical," he stated, "is at an end." We must no longer be reluctant to join in the establishment of international codes and standards. "Our ability becomes greater through collaboration."

(The 14th Annual Assembly of the IIW was held just prior to the AWS convention. More than 500 foreign delegates from 24 countries registered for the technical sessions held at the Sheraton-Atlantic Hotel.)

Following the president's address, 28 of the welding industry's leaders were honored with 15 national and 13 regional awards. Among the recipients were:

¶ M. D. Stepath, president, Arcair Co. — the Samual Wylie Miller Memorial medal for outstanding contributions toward the advancement of the art of welding and cutting.

¶ Henri P. Granjon, Ecole Superieure de Soudre Autogene — the Adams Lecturer certificate and honorarium.

¶ H. E. Rockefeller, Linde Co. — honorary membership in the American Welding Society.

¶ J. Heuschkel, Westinghouse Research Laboratories — the Lincoln Gold Medal award.

¶ G. E. Claussen, Arcrods Corp., and H. E. Miller, The Carrier Corp. — National Meritorious Service awards.

¶ A. L. Cooper and W. H. Morse (Westinghouse Electric Corp.); C. A. Zwissler (Kaiser Steel Corp.); and M. Friedmann (Friedmann Welding Co.) — A. F. Davis Silver medals.

¶ Dr. N. N. Rykalin, U.S.S.R. Academy of Sciences, — Educational Lecturer certificate.

¶ W. H. Munse (University of Illinois); W. E. Savage (Rensselaer Polytechnic Institute) and R. C. Wiley (California Polytechnic Institute) — Adams Memorial memberships for advancing the knowledge of welding technology in an educational institution.

¶ R. D. Thomas, Jr., Arcos Corp. — Past President's certificate.

In addition, 13 district meritorious certificates were awarded.

On Monday evening, President-elect A. F. Chouinard greeted AWS and IIW members, their wives and guests at the annual president's reception in the Hotel Commodore's Windsor Ballroom.

The annual banquet, with Belgian Ambassador Louis Scheyven delivering the keynote address, followed the reception.

During the five days of the meeting, 103 papers were presented by 66 authors at the 22 technical sessions, including nine papers by 12 IIW members. Nine other papers were co-sponsored by the American Institute of Electrical Engineers.

Running concurrently with the technical sessions

AWS WELDING SHOW . . .

was the three-day Welding Show at the Coliseum where more than $3 million worth of welding and allied equipment was on display.

Manipulators, an electrogas welding process, hardfacing units, resistance welding controls, a new metal cutter, a flux-coated brazing alloy, an oxy-propane flux brazing method, these were just a few of the new products shown.

Of particular interest were American Machine & Foundry Co.'s friction welder (*see WE, January, p.* 39) and Hobart Brothers Co.'s automatic welder for joining large diameter pipe in the field (*see p.* 46 *in this issue*).

OFFICIAL opening of the Welding Show was marked by traditional chain-cutting ceremony (above, right). Mlle. Blosset of the French Institute of Welding did the honors while President-elect Chouinard stood by. On the closing day of the show, William D. Kidd, Paterson, N. J., (left in photo at right) was announced winner of the 1961 *Ford in Metal & Thermit Corp.'s guessing contest. Using a mathematical approach, Kidd estimated to within two of the* 8,549 *electrodes in the plastic box. M & T's Nicholas Kiernan makes the presentation.*

PROGRESSIVE makes BIG fixtures

For many years Progressive has pointed the way to better production in American Industry with new ideas in welding equipment and fixtures.

Today Progressive's modern facilities and extensive experience offer dependable solutions to the many unusual problems confronting industry the world over.

This gigantic (24′ diameter x 70′ length) booster assembly fixture for the Saturn missile, shown above, is a good example of Progressive's tremendous facilities and abilities.

Progressive's experience can save you time and money. Our engineers will gladly discuss your requirements.

THE **PROGRESSIVE** WELDER & MACHINE CO. 915 Oakland, Pontiac, Mich.

For more facts Circle No. 183 on Welding Info-Aid Card

LEFT: L. D. T. Berg, Air Reduction Sales Co., accepts award plaque from T. B. Jefferson, publisher of WELDING ENGINEER. Seated in foreground is luncheon speaker, Major General C. A. Willoughby.

RIGHT: A. J. Fisher, Jr., Metal & Thermit Corp.

WE celebrates 45th anniversary with awards luncheon

CELEBRATING its 45th anniversary year, WELDING ENGINEER honored five welding equipment manufacturers at a special luncheon during the AWS convention in New York City.

Award plaques (*see photos*) were presented to Air Reduction Sales Co.; National Cylinder Gas Div., Chemetron Corp.; Linde Co.; Metal & Thermit Corp.; and Westinghouse Electric Corp.

Almost 200 persons attended the luncheon, which was held at the Park Lane Hotel on Monday, April 17.

Main speaker at the affair was Major General C. A. Willoughby, Chief of Intelligence under General Douglas MacArthur from 1939 to 1951.

The General discussed the growing Communist menace, emphasizing Communist infiltration into the United States and collaboration by many Americans.

LEFT: J. H. Henkin, National Cylinder Gas Div., Chemetron Corp.

BELOW: Richard Lipps, Westinghouse Electric Corp.

ABOVE: R. F. Flood, Linde Co.

CLOSE-up of plaque awarded to Linde Co., similar to those awarded to other four manufacturers.

Gevaert STRUCTURIX

INDUSTRIAL X-RAY FILM

READY-TO-USE PACKAGING:
MORE CONVENIENCE!
GREATER ECONOMY!
GEVAERT QUALITY!

UNI-PAK

Individually packaged sheets, in double-wrapped, light-tight envelopes, with cardboard stiffener. Simply remove the enveloped sheet of film from the 100-sheet carton, in broad daylight, and you're ready to shoot! Ideal for use in low Kv range *(about 130 Kv or less)* where lead screens are not normally required. *Available in a wide range of sizes, in choice of D2, D4, D7, D10 or S, for individual requirements.*

BI-PAK

Every duplex envelope contains a sheet of D4 and one of D7 film, each in its individual wrap, with a cardboard stiffener. Permits a single radiograph to be made of a subject with greatly varying thickness; D4 recording the thin portion, D7 the heavy portion. Sixty pairs to a box—extremely wide range of sizes! *Other combinations of Structurix Film in Bi-Pak packaging available on special order.*

STANDARD SIZE SHEETS AND ROLLS: Structurix Sheets are available in five emulsion types, in boxes of 75 sheets interleaved or 100 sheets NIF. Wide range of sizes! Structurix is now available in economy bulk packaging—300 sheets interleaved and 500 sheets NIF. Structurix Rolls in 16mm, 35mm, 70mm are available in D2, D4 and D10 emulsion types. *For Structurix samples, write the nearest Gevaert District Office:*

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MID-STATES
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SILICON POWERED 3 PHASE RECTIFIERS

Model SIL 300 DC

SAVE on operating costs. Silicon rectifiers save over $100.00 per year on power when compared with selenium rectifiers.

SAVE another $140.00 on power when silicon rectifiers are compared with motor generator sets.

SAVE on maintenance costs. No moving parts (other than the fan) that require regular servicing.

SAVE on valuable floor space. The SIL-A-TRAN is only 22 x 24 x 44.

Available in 200, 300 and 400 amps.

M S MID-STATES WELDER MFG. CO.
6025 South Ashland Ave. Chicago 36, Ill.

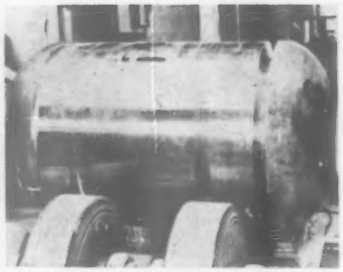
ACRO WELDER MFG. CO.
MILWAUKEE
WELDING ENGINEERS
MACHINERY BUILDERS
ESTABLISHED 1936

ACRO® general purpose spot-projection-butt-seam resistance welding machines.

ACRO-ARC® special purpose production welding machinery employing automatic arc welding processes.

ACROMATIC® special purpose production welding machinery employing resistance welding processes.

ACRO-MAGNETIC® magnetic force spot, projection, and percussion welding machines.



COVER and bottom sections of this nuclear demineralizer for a U.S. Navy destroyer have been Tig welded to the shell.

Nuclear ship gets welded demineralizer

AS NUCLEAR SHIPBUILDING creates new welding problems, new ideas arise to solve them.

One such problem: specifications for reactors and auxiliary equipment often require welding of special alloys and stainless steels in heavier sections than most shipbuilders are familiar with.

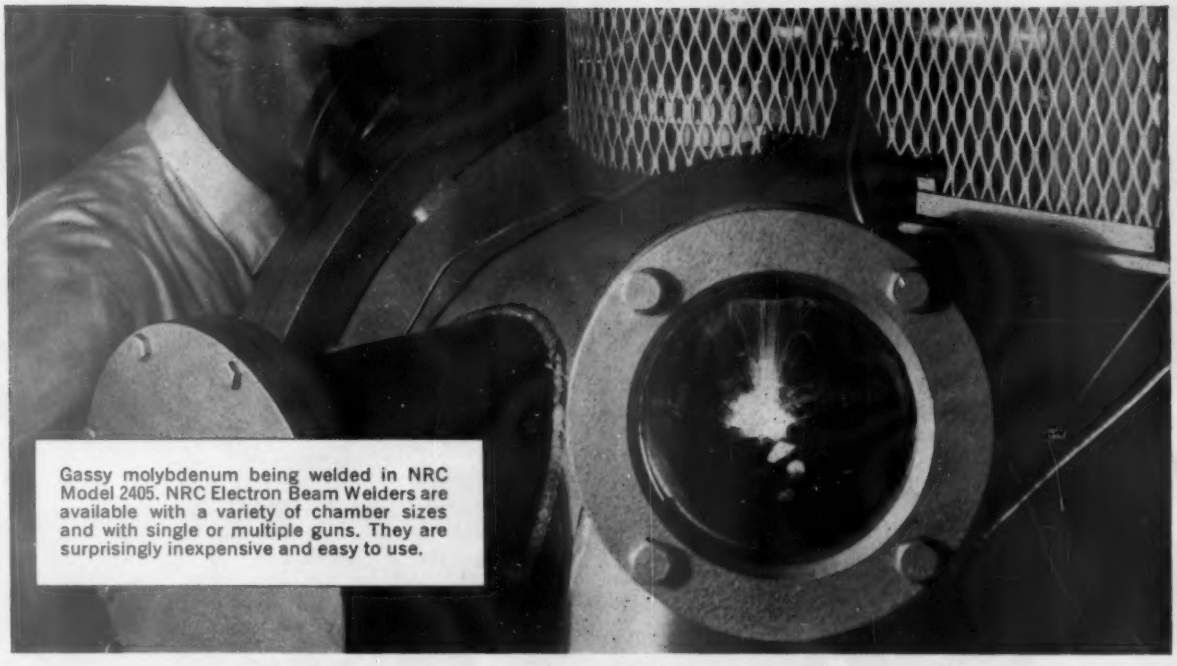
For example, a new method had to be used to fabricate a prototype stainless steel demineralizer for a U.S. Navy nuclear destroyer. The 8-ton demineralizer has 2-in.-thick walls and stands 7-ft high with a 24-in. diameter.

Using Tig welding with an EB insert, Avery & Saul Co., Cambridge, Mass., made a root pass to join the cover and bottom sections to the shell, substantially reducing welding time.

In the EB process, a preplaced weld insert is used. The insert, fused by a Tig torch, permits full-penetration root passes even though welding is done from one side only.

Filler wire was ER 308L for the first few passes laid by Tig. This same alloy was used as the electrode when subsequent passes were made by the submerged-arc process with Arcosite S-4 flux. Both wire and flux were supplied by Arcos Corp., Philadelphia.

For more facts Circle No. 186 on Welding Info-Aid Card



Gassy molybdenum being welded in NRC Model 2405. NRC Electron Beam Welders are available with a variety of chamber sizes and with single or multiple guns. They are surprisingly inexpensive and easy to use.

WELD "UNWELDABLE" METALS . . .

BY ELECTRON BEAM— VACUUM PROCESS

Precision Welds in Tantalum, Columbium, Molybdenum, Tungsten, Zirconium and many other "difficult" metals.

Ultra pure welds, impossible by ordinary welding, are possible by Electron Beam—Vacuum Welding.

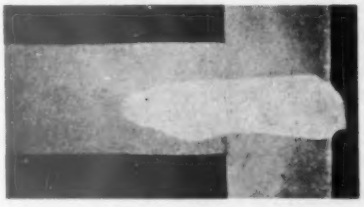
In this type welding, work is positioned in a high-vacuum chamber and heated by bombardment of high energy electrons. The combination of heating by electrons and operation in a high vacuum assures that no contamination is introduced during the process. In addition, surface oxides and other contaminating films are often eliminated . . . resulting in welds that are exceptionally pure, sound and free from porosity.

With NRC's Electron Beam—Vacuum Welding equipment, you get the finest matched components, including NRC's new Series "HS" Ultra-High Speed diffusion pumps.

Write for data sheet, specifications and prices on NRC's Electron Beam—Vacuum Welding equipment. Dept. 35F, 160 Charlemont Street, Newton 61, Mass. DEcatur 2-5800.

What's So Wonderful About Electron Beam Welding?

Freedom from contamination; Minimum heat affected zone; Unlimited temperatures; Depth/width ratios to 4/1; Precise control of spot size and position; Operation in high vacuum. These advantages are daily solving problems posed by reactive metals, dissimilar materials, heat sensitivity, and unusual geometry.



Typical Solutions

- Inaccessible joints made by "continuous spike weld" (illustrated).
- Seam welded tungsten and tantalum tubes.
- Delicate instruments evacuated and sealed.
- Sintered plate welded without cracking.
- Finish machined parts joined without distortion.
- Precision bead at bottom of 1/16" slot.
- Titanium insert edge-welded to copper sleeve.
- Thin and thick sections joined easily.
- Crackless welding of glass-sealed feed-thru to sleeve.

NRC EQUIPMENT CORPORATION

A Subsidiary of National Research Corporation
Dept. 35F, 160 Charlemont St., Newton 61, Mass.
DEcatur 2-5800

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This Helium Transport, built by The Taylor-Wharton Division of Harsco Corporation for General Dynamics Corporation can deliver 114,000 standard cubic feet of Helium at a pressure exceeding 2,400 p.s.i. from Amarillo, Texas to Los Angeles, California; a distance of 2,166 miles round trip.

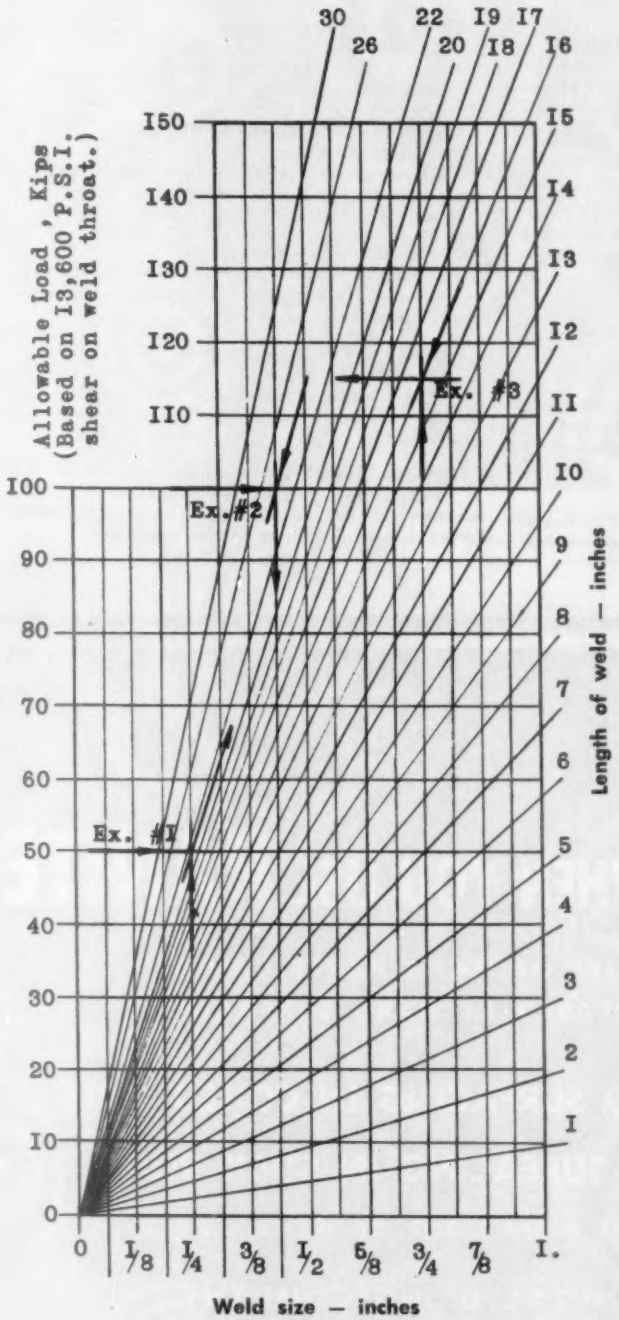
As in many other cases, this transport has provided more efficiency and economy in operations than would have been found in any other means of transportation.

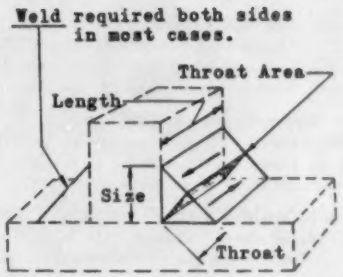
For their semi-permanent storage as well as for transporting compressed gases, many gas producing, oil refining, petro-chemical, food and electronic companies now employ flexible, mobile gas transports.

Why don't you? Write to:

HARRISBURG STEEL CO.
Division of HARSCO CORPORATION
HARRISBURG 2, PENNSYLVANIA

Computing fillet weld stress





Example No. 1

For a load of 50 kips and weld size of ¼ in., length required equals 21 in. Weld 10½ in. on each side.

Check:

¼ times 0.707 times 13,600 times 21 equals 50.4 kips allowable.

Example No. 2

For a load of 100 kips and 24 in. total available length, a 7/16 in. weld size is required.

Check:

7/16 times 0.707 times 13,600 times 24 equals 101 kips allowable.

Example No. 3

Using 16 in. of ¾ in. weld, the allowable load equals 115 kips.

Check:

¾ times 0.707 times 13,600 times 16 equals 115.5 kips allowable.

Note: Minimum code weld length equals 1½ in.

© Earl Kent, 1961

Reprints still available from WELDING ENGINEER

Reprints of certain articles published in Welding Engineer are still available. A list of these appears below. Reprints may be obtained for 15 cents each, except where otherwise noted. Payment must accompany all orders. For quantity orders, write for special prices. Order by title from: Reprint Editor, Welding Engineer Publications, Inc. Box 28, Morton Grove, Ill.

Fundamentals of wear resistant overlay
Explains causes of metal deterioration and how to avoid it and how to select a welding process for hardfacing. This reprint 25¢ each.

Design for welding
Basic knowledge required when designing or redesigning for welded construction is detailed and discussed. Sixteen page reprint includes 11 data sheets.

The meaning of weldability
Weldability of carbon steels and alloy steels, as well as some other metals, is discussed. Sixteen page reprint includes three data sheets.

How to weld T-1 steel
Explains how to weld this high-strength low-alloy metal. Includes a data sheet on T-1 mechanical properties.

Fundamentals of oxyacetylene welding
Gives the basic essentials on and primary steps of oxyacetylene welding.

Welding of dissimilar metals
Complete details on welding dissimilar metals using NiCrFe electrodes and wires. Eight page reprint includes charts on properties test results and data sheet on properties of other metals.

A guide to preheat
This 4-page reprint on benefits of preheat includes an engineering data sheet entitled "Recommended preheat for steel alloys."

Acetylene
A 12 page salute to the IAA and acetylene, details the great success of this gas. Includes a history of the IAA and "The Acetylene Journal."

Filler metals for brazing
Brazing filler metals are detailed and each group is analyzed. Includes data sheet on how to select silver brazing alloys.

Explosive welding and forming open another door
A report on one of the newest entries into the welding industry, and how one pioneer company turned theories and practices into realities.

Our modern-day mythology
A rebuttal to some old-wives tales about the hazards of welding fumes, plus safety recommendations for situations where hazards might develop.

Welding the reactive metals
This 12-page reprint describes techniques for Tig welding titanium, zirconium and tantalum. It also gives experimental data on resistance spot welding of tantalum.

Welding 17-4 PH stainless steel
Sound joints can be easily produced in 17-4 PH stainless by proper welding practice. This 4-page reprint details all phases of the procedure.

(*Continued on page* 66)

YOU SAVE WHEN YOU USE RANITE

THE SERVICE LIFE OF MANY PARTS CAN BE GREATLY INCREASED BY HARD SURFACING

RANOMATIC HARD SURFACING IN COILED WIRE

RANITE HARD SURFACING IN STICK ROD

CALL YOUR RANITE DISTRIBUTOR OR WRITE DIRECT

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Great Dane Operator Terry Smith makes light work of blending a heavy weld bead on one of Great Dane's newest tank trailers. (Guard removed for photography.)

Bay State representative Hugh McKane shows the unique "Koolie Hat" shape to Great Dane Supervisor Malcolm Williams as Operator Terry Smith looks on.

"KOOLIE HAT WHEELS
SURE TAKE A LOAD OFF MY BACK"

That's just the main advantage of Bay State's "Koolie Hat" resinoid disc wheel, according to Operator Terry Smith. He's been using off-hand grinding equipment at Savannah's famous Great Dane Trailer Company for a good many years now, so he knows what he's talking about.

"Sure, there's a difference," says Smith, "and you can feel it in your arm and back muscles. With a regular weld-grinding wheel, you have to hunch over and fight it all the time so your muscles start aching in a few minutes. This "Koolie Hat" deal cuts smooth and easy without your putting a lot of pressure on it. And it doesn't skid around like the regular wheels either."

Well, that's one experienced operator's opinion. How about checking your own men? See if the new Bay State "Koolie Hat" doesn't cut your accident and fatigue-fumble rates . . . as well as other cost items.

For full engineering details and a no-obligation demonstration, contact your Bay State distributor or direct representative or write us. *Better grinding at lower cost . . . that is our business.*

NEW U-grade formulation complements original "Koolie Hat" R-grade wheel, ensures extra-long life. Designed specially for maximum effectiveness on high speed, air-driven or electric portable grinders that operate at 5200 r. p. m. or more.

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

BAY STATE WHEELS of PROGRESS

Circle No. 191 on Welding Info-Aid Card

product defects

getting you down?

let us help you...

✓ find hidden cracks
with magnetic particle or dye penetrant inspection equipment

✓ find deep-lying defects
with x-ray or gamma radiography equipment

✓ see "innards" directly
with bright-image fluoroscopes

✓ work out the method
at our Industrial Applications Lab

call any local Picker office
where a technical expert is always near (see 'phone book) or write

Picker x ray

25 So. Broadway, White Plains, N. Y.

Reprints available

(*Continued from page* 64)

Non-destructive testing

Four separate articles comprise this 8-page reprint on non-destructive testing: how to interpret radiographs; circumstances and job requirements govern selection of radiation source in inspection; ultrasonic testing; and a program for radiation safety.

Welding thoriated magnesium

Development of specialized machinery and techniques for joining new magnesium alloys, especially thoriated types, has aided in the production welding of such materials. This 4-page reprint includes tables on mechanical properties and on weld defects and how they affect weld strength.

Effect of arsenic on welds

A study of arsenic's effects on the mechanical properties of welds in mild steel was directed specifically toward a determination of arsenic's role in behavior of welding fittings. Results are revealed in this 4-page reprint.

Stress relieving

Stress relieving can be an important manufacturing operation or a needless expense item. This 4-page reprint is intended to help you in making a correct decision in the matter.

Uses of build-up electrodes

As rebuilding and reclaiming of worn steel parts becomes standard maintenance procedure, build-up electrodes increase in importance. This 2-page reprint lists the qualities necessary for a good build-up material.

Production welding controls

Discusses how material, labor and overhead effect total production welding costs, and how certain controls can result in greater time and dollar savings. This reprint is free.

WEBB

TANK PRODUCTION MACHINERY

Horn Jigs
Offsetters
Seam Welders
Turning Rolls
Track Supports
Assembly Presses

Model M-2 with rotating turntable for reversing ends when both ends are to have offset-flanges.

Complete catalog on any type or size machine furnished on request.

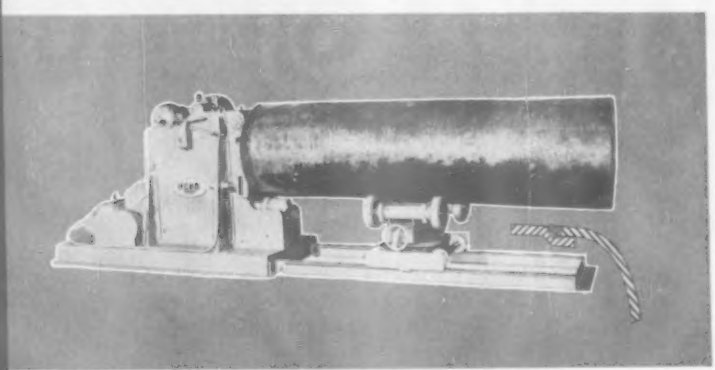
Since 1881
THE WEBB CORP.
REED EQUIPMENT DIVISION
WEBB CITY, MO. U.S.A.

WEBB OFFSETTER

for forming an offset flange around shell ends to facilitate automatic welding of tank heads.

- Eliminates chill rings
- Improves concentricity of shell ends
- Shortens fit-up time
- Helps reduce welding time

Available in four models to handle up to ½" plate.
With standard dies.
New M 2-P pipe duty 6" to 30" up to ¼" thick.

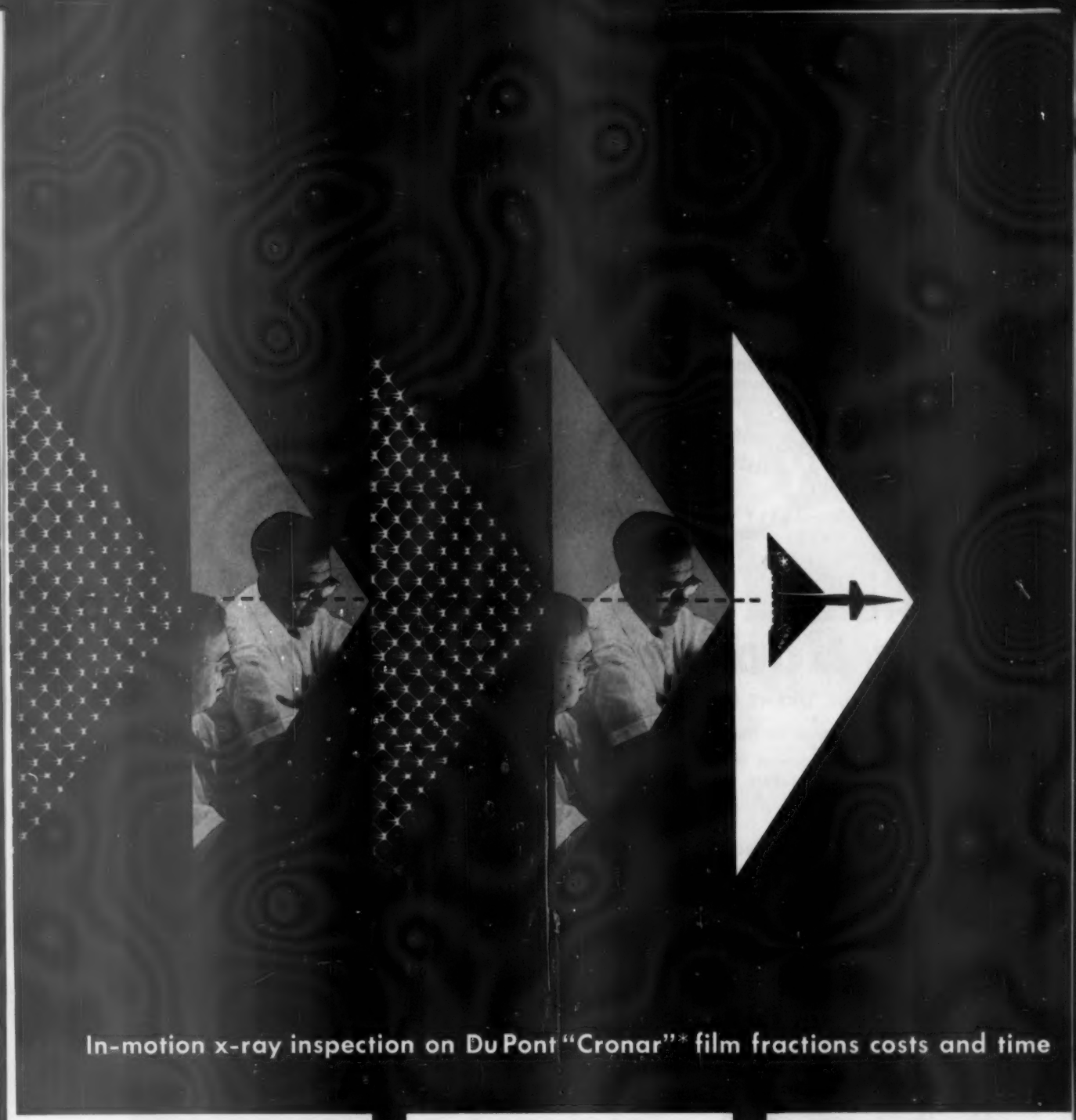


WEBB ASSEMBLY PRESS

Companion fixture for assembling heads to shells — shells to shells.
• 25 tons closing pressure • Built-in fit-up rolls • Built-in kick-out lift • Adjustable for tank diameter and length
3 standard sizes to handle up to 72" diameter
Combination Assembly and Girth Welding Machines also available.

For more facts Circle No. 192 on Welding Info-Aid Card

For more facts Circle No. 193 on Welding Info-Aid Card →



In-motion x-ray inspection on Du Pont "Cronar"* film fractions costs and time

North American Aviation, Inc., uses an x-ray tube coned down to a narrow slit to make exposures on honeycomb panels manufactured for the Air Force's 2000 m.p.h. B-70 bomber. Foreman Wally S. Demming and Production Development Lab Associate Glen E. Boyce, seen above, are inspecting one of the pictures. They are made with a constant KVP and MA as the panels travel across the tube, moving 1-5 feet a minute.

Panels are angled so that the nodes (where core cells join) are not superimposed in the picture. Motion blurs out the brazing fillet on the tube side of the panels, allowing a larger area to be radiographed. CRONAR 506 or 510 film is used in specially-designed plastic holders that are a foot wide and from 2 to 10 feet long.

The unique clarity of CRONAR films—plus the consistency of their emulsion and the stability of their base—adds to the accuracy and economy of North America's in-motion technique. To learn more about these films and other fine industrial x-ray products, write E. I. du Pont de Nemours & Co. (Inc.), Photo Products Department, Wilmington 98, Delaware. In Canada: Du Pont of Canada, Ltd., Toronto.

*Du Pont registered trademark for its polyester photographic film base

DU PONT
REG. U.S. PAT. OFF.

Better Things for Better Living
. . through Chemistry

low hydrogen electrodes high moisture

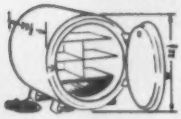
END THIS COSTLY AFFAIR BY KEEPING YOUR RODS AT HOME *in*

PHOENIX DryRod®

ELECTRODE OVENS

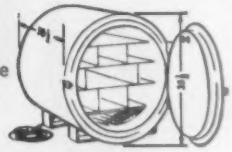
Pioneer and Leader in the Field

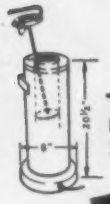
Dry Rod is the Trademark of Good welding everywhere



TYPE 300
350 lb size

TYPE 900
1100 lb size





TYPE 10
Portable
10 lb size

Also available:
Type 1000, 8000 or 10000
High temperature Re-baking ovens

Welding electrodes are a perishable product. Reworks are extremely costly. Insure good welds with Dry Rod Ovens. Write for folder "Dry Rod as Standard Welding Equipment".

PHOENIX PRODUCTS COMPANY
4727 N. 27th Street • Milwaukee 9, Wis.

Circle No. 194 on Welding Info-Aid Card

WE June Headlines

. . . from page 8

A THREE-YEAR outdoor corrosion comparison test in a mild industrial atmosphere was an important part of Armco Steel Corp.'s development of paintable hot-dipped zinc-coated steels with increased weldability.

Zinc-coated sheet improves paintable steel weldability

A new spangle-free hot-dipped zinc-coated sheet designed specifically to improve galvanized steel paintability while giving maximum corrosion protection has been developed by Armco Steel Corp., Middletown, Ohio.

The spot welding properties of the new material are also superior to those of paintable standard zinc-coated steels, according to Armco.

The new Zincgrip A, Paintgrip, carries a 1.25-oz class zinc coating and is being produced also in light commercial coating weight.

Zinc-coated steels have been noted for the difficulty they cause in resistance spot welding. According to Armco, the new galvanized sheets can take almost twice as many spot welds as regular galvanized sheet.

The new sheet can be drawn, formed and lock seamed to the limit of the base metal without flaking or peeling in gages 16 through 24 and 36-in. or 48-in. widths depending on the gage.

THE seventh floor of this modern 20-story building at 850 Third Ave., New York City, houses the new offices of Handy & Harman, brazing alloys fabricator. The move came after 94 years of transacting business in New York's traditional financial district in lower Manhattan.

NOW!

CHOOSE ONE OF 4 WAYS TO REPAIR GALVANIZING . . .

- coating
- stick
- powder
- bar

DRYGALV The "wonder tonic" for all maintenance work, galvanizing repairs. Requires no heat. Gives steel permanent protection against rust and corrosion through its cathodic action. Coating contains 95% metallic zinc. Easy to apply by brush or spray on all ferrous metals — over traces of rust, partially painted surfaces, clean metal, welded joints, galvanized surfaces. Dries in 15-30 minutes. One gallon protects 400 square feet of metal. Meets U. S. Government Specifications for repair of Galvanizing.

AMCO GALVANIZING COMPOUND IN STICK FORM, No. 322

convenient pocket size compound for repairing damaged galvanizing. Easily and quickly applied to surfaces not suitable for powder. Simply heat area required and brush with AMCO stick. Leaves a continuous, uniform, bright and protective coating. Meets U. S. Government specifications for repair of galvanizing.

AMCO GALVANIZING POWDER, No. 321

Makes fast, permanent repairs of all damaged galvanized surfaces. Forms free flowing paste with water, applied by brush. Heat and wipe with cloth. Cleans the surface of all rust and foreign matter. Meets U. S. Government specifications for repair of galvanizing.

AMCO GALVANIZING BAR, No. 3017

In convenient, handy form — ¾" square, 14" long; weighs only 5 ounces. Surface to be repaired needs no cleaning — simply heat the surface, rub AMCO bar over area, then wire brush. No applicable government specs.

Available from your local distributor *or write*

AMERICAN SOLDER & FLUX COMPANY

1903 W. Willard St., Philadelphia 40, Pa.

Circle No. 195 on Welding Info-Aid Card

ONE of the 90 exhibits at the recent safety convention was this one by Fibre-Metal Products Co., Chester, Pa.

31st Safety Convention features 200 speakers

An estimated 8,000 people attended the recent 31st annual Safety Convention of the Greater New York Safety Council which featured 200 speakers and 90 exhibition booths.

Exhibitors included: American Optical Co., New York City; Bausch & Lomb Optical Co., New York City; Fibre-Metal Products Co., Chester, Pa.; Frommelt Industries, Inc., Dubuque, Ia.; Merrill Bros., Maspeth, N. Y.; Mine Safety Appliances Co., Mountainside, N. J.; and Pulmosan Safety Equipment Corp., Brooklyn.

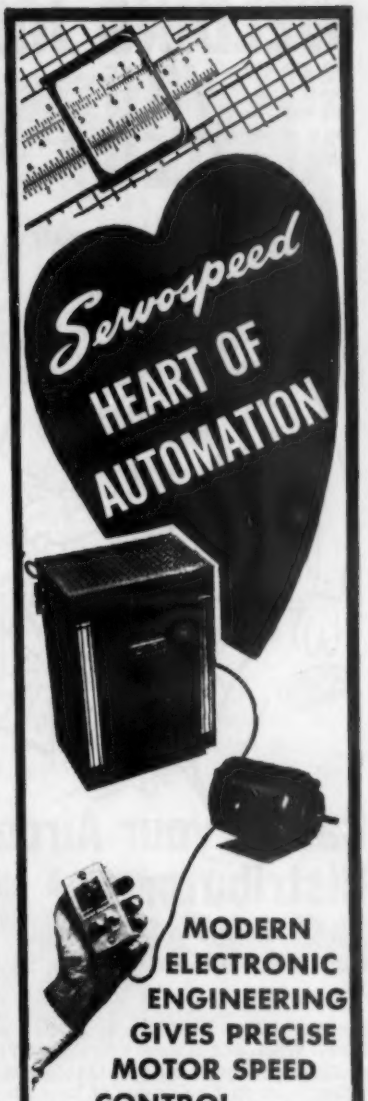
Other exhibitors were United States Safety Service Co., Kansas City, Mo.; Watchemoket Optical Co., Inc., Providence, R. I.; Welsh Mfg. Co., Providence, R. I.; and Willson Products Div., Madison, Wis.

Automatic welder joins contacts to springs

A capacitance-percussive welder has been developed to automatically join 17 contacts to their wire springs.

The welder, developed by Automatic Electric Co., Northlake, Ill., in conjunction with Acro Welder Mfg. Co., Milwaukee, includes a row of 17 springs molded into a plastic mounting bar.

The butt-end of the 0.040-in.-diameter nickel-silver wire spring is welded to one contact face 0.125-in. by 0.090-in. by 0.045-in.



MODERN ELECTRONIC ENGINEERING GIVES PRECISE MOTOR SPEED CONTROL

1/100 — 10 H. P.

Modern industrial electronic engineering has been coordinated with electric motor design to provide a versatile means for obtaining the full possible advantage of speed control in DC motors while operated from the regular alternating current power line. Grid controlled "Thyratron" tubes are utilized for power controlled stepless variation to supply motor armature power. Patented feedback, or "Servo" circuits provide constant torque capability over wide speed ranges of as high as 60 to 1 in some models and a minimum of 20 to 1 in others.

Servospeed

DIV. of ELECTRO DEVICES, Inc.

4 Godwin Ave., Paterson, N. J

ARmory 4-8989

Circle No. 196 on Welding Info-Aid Card

WELDING JOB GOT YOU PUZZLED?

Call in your Airco Distributor...

Expert on oxyacetylene welding, stick electrode or gas shielded arc welding

Some of today's welding jobs are pretty tricky. When one of these jobs just won't go right, call in your Airco Distributor. Chances are that he or one of his salesmen has handled a job much like it. He can help you. Because he knows all the practical ins and outs of welding and he is backed by Airco's unexcelled experience.

For the equipment you need, choose from the **AIRCO** quality line of gas welding and cutting equipment – arc welding equipment and arc welders – gas-shielded arc welding process equipment – flame cutting machines – high purity and rare industrial gases – electrodes – supplies and accessories.

Phone your nearby Airco Distributor. He's listed in your Classified Telephone Directory under "Welding Equipment and Supplies."

AIR REDUCTION

... represented by over 700 Authorized Airco Distributors from Coast to Coast

AUTHORIZED AIRCO DISTRIBUTOR

Circle No. 197 on Welding Info-Aid Card

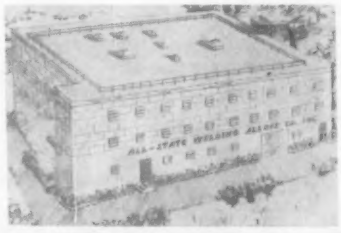
H. J. LANGE, president of Marquette Corp., literally breaks ground for the firm's new electrode plant. Marquette officials out for the event included (from left) C. M. Atkins, executive vice president; Lange; Dr. F. W. Scotte, plant manager; and E. M. Thielen, assistant plant manager.

Marquette breaks ground for new electrode plant

Marquette Corp., Minneapolis, has broken ground for a new $450,000 welding electrode plant.

The 21,000 sq-ft plant will be ready this fall and is expected to double the firm's capacity for producing welding electrodes. A second floor was recently added to the present electrode plant located across the street from the new building.

New automatic wire-drawing equipment in the plant will draw hot rolled rods to wire sizes from 1/16 to ¼-in. diameter. Marquette previously purchased the finished wire stock.



ARCHITECT'S drawing shows the new manufacturing building for All-State Welding Alloys Co., Inc., which will be completed this summer on land adjacent to the railroad siding opposite the main office and plant in White Plains, N. Y. All-State is currently celebrating its 15th anniversary (See In retrospect p. 77).

Circle No. 198 on Welding Info-Aid Card

Eisler makes the largest assortment of precision press type welders, spot, wire butt, seam, tweezers gun and flash welders. We also carry in stock a large assortment of welding tips and accessories.

EISLER ENGINEERING CO., INC.
749 S. 13th Street Newark 3, N. J.

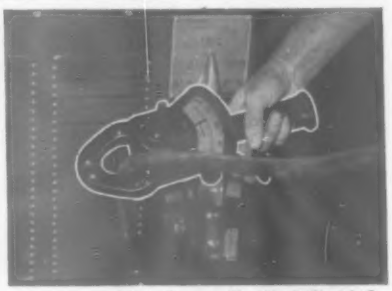


Photo Courtesy The Lincoln Electric Co.

now . . .

ONE AMMETER for AC/DC WELDERS

Only **TONG-TEST** measures both AC and DC

Weld with confidence. Use the exact amperage – no more, no less – to assure welding quality. Prevent costly rejects by controlling the welding current (AC or DC) with one TONG TEST AMMETER. Simply snap tongs around electrode cable – read amps instantly and accurately. No electrical connections required, cannot burn out. Interchangeable ranges up to 1000 amperes.

Write for Catalog WE-400

COLUMBIA ELECTRIC MFG. CO.
4551 Hamilton Avenue • Cleveland 14, Ohio

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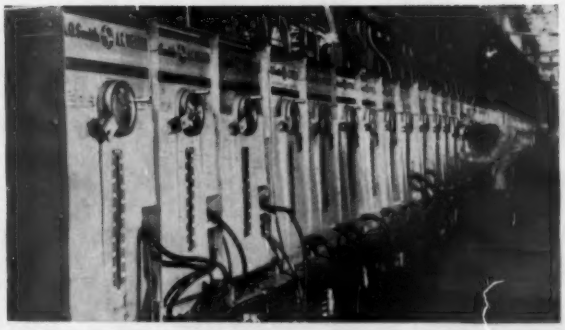
In Summary . . .



At the automotive production facilities of **A. O. Smith Corp.**, Milwaukee, a single installation (see cut) consists of 96 a-c arc welding machines generating 400 amp each for a total of 38,000 welding amps . . .

Lord Chemical Corp., York, Pa., abrasives manufacturer, is now known as **Lord Chemical and Equipment Div.** of **Wheelabrator Corp.**, Mishawaka, Ind. . . . A new acetylene plant to supply **Colorado Fuel & Iron Corp.**, Pueblo, Colo., is now under construction at Pueblo by **Linde Co.**, New York City. . .

The entire manufacturing facilities of **Sun-Heat, Inc.**, Holt, Mich., have been moved to 998 E. Woodbridge, Detroit. . . **U.S. Steel's Oliver Iron Mining Div.**, Duluth, Minn., has specified the use of high yield strength steel for truck bodies in an effort to increase payload of mine haulage trucks by reducing dead weight. . .

Inland Steel Co., East Chicago, Ind., and several other steel companies are producing thin-gage tin plate to meet efforts of aluminum sheet producers seeking to produce aluminum for soldered cans which do not require full weight tin plate. . .

Lightweight copper alloy welding tips.
"A Hot Tip to Improve Your Welding & Cutting!"
DOCKSON TORCHES
Unique swivel nut holds nozzle at any angle
Expert workmanship, quality materials, perfect balance, rigid one-piece silver-soldered construction — Dockson offers the finest in lightweight, low cost torches built for long, dependable service.
Write for Dockson's complete Welding and Cutting Equipment Catalog.
MODEL 5 WELDING TORCH
Non-loosening extruded brass fluted handle.
Forged bronze valves, integral with handle, use special composition washers.
TOP QUALITY AND PERFORMANCE for amazing economy and value
Dockson CORPORATION
MODEL 3BB LEVERMATIC WELDING TORCH
MODEL "CM-57" CUTTING TORCH
C-5 CUTTING ATTACHMENT
3839 WABASH AVE. • DETROIT 8, MICH.

For more facts Circle No. 200 on Welding Info-Aid Card

VIPs in review . . .

AT a special executive banquet, Henry Harnischfeger (center) congratulates Walter Meitner (left) and John Farley on 45 years of service with Harnischfeger Corp., Milwaukee. Harnischfeger is president of the firm. Both Farley, supervisor of the central engineering division, and Meitner, repair parts supervisor, were presented with watches.

Delta Oxygen Co., Inc., Memphis, Tenn., has appointed **Ed Tucker** sales manager. Tucker replaces **J. W. Bonds** who has opened Bonds Welding Supply, West Memphis, Ark., and will be a reseller for Delta.

James C. Collins has been appointed marketing manager of the instruments division of The Budd Co., Philadelphia. He has been the firm's market research manager for the past two years.

J. E. Van Stone has been appointed Cleveland district manager for Hewitt-Robins, Inc., Stamford, Conn. **R. S. Schuba** has been appointed Detroit district manager for the firm which produces industrial rubber products including hose for oxygen.

William W. Whitnell and **Roy T. Omundson** have been elected board members of Chemetron Corp., Chicago. Whitnell is corporate vice president of the firm and Omundson is also corporate vice president and president of the Cardox Div.

J. D. Webster has been named industrial marketing manager at the X-ray department of General Electric Co., Milwaukee. Webster has been manager of the department's industrial sales for seven years.

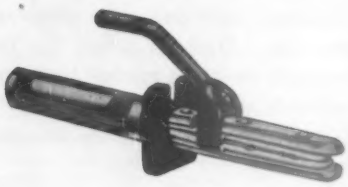
Webster

Townsend

T. H. Townsend, Jr., has been appointed central region manager for the Pure Carbonic Co., a division of Air Reduction Co., Inc., New York City. Townsend will headquarter in Cleveland.

DURO ELECTRODE HOLDERS

THE DURO "STANDARD"



* Featuring "Long Jaw Design" for reaching hard to get at places.
* Cool operation-cool handling.
* Insulated handle and guard protects the operator.
* All parts easily replaced.

THE "ADJUSTABLE TENSION"

* Easy adjusting of Spring Tension for your requirements.
* New type cable connection prevents fraying of cable.
* Aluminum model weighs only 13 oz.
* All parts replaceable including copper alloy jaw.

For further information write:

THE DURO MANUFACTURING COMPANY

71 Oregon Avenue, Hamden 17, Connecticut

Smith

McBurney

Chairman of the board of the newly-formed Tescom Corp., Minneapolis, is **L. L. McBurney.** President of the new corporation is **Jack E. Smith.** The new firm was formed after a corporate name change by Smith Welding Equipment Corp. which is now a division of Tescom.

W. B. Moen has been appointed manager of Air Reduction Sales Co.'s Cryogenic Engineering Dept., Plainfield, N.J. Moen will be responsible for design and construction of major air separation and related cryogenic plants.

Skil Corp., Chicago, has appointed **Emilio Desevernine** to the position of public relations manager.

W. L. Killen, vice president of manufacturing and engineering, Pressed Steel Tank Co., Milwaukee, has been elected to the board of directors of the firm. Killen is executive vice president of Downingtown Iron Works, Inc., a wholly-owned subsidiary of Pressed Steel.

Killen

Oppenheim

C. E. Oppenheim has been appointed Midwestern regional manager for Alloy Rods Co., York, Pa. **E. R. Walsh, III,** vice president in charge of sales, states that Oppenheim will headquarter in the company's new offices at 445 N. Lake Shore Drive in Chicago. **Wiley N. Cox** has been appointed field representative for the company serving the Southwestern states area.

Spot Weld Easier with Tuffaloy — For Less!

NEW IDEA!
ALL ALUMINUM SPOT WELDING TIP HOLDER

It took a complete departure from previous manufacturing methods to come up with this low-cost, high quality spot welding tip holder (each is a slice of a giant aluminum extrusion). These TUFFALOY holders are corrosion resistant, carry threaded tip adapters to take the brunt of tip socket wear. For welding pressures to 1000 lbs.

THE TRADEMARKS TO TRUST
AIRCO

NEW IDEA!
PADDLE-TYPE HOLDER
USES NO 'T' CONNECTOR

A new design idea makes this TUFFALOY Holder more rugged, long-lived, and lower in cost to use—no tee connector is needed. Ideal for spot welding in restricted areas. TUFFALOY Socket-Type Tips (four nose types available) may be inserted on either side of the paddle.

Doc Tuffy says . . . be quick to use everything that improves your product or cuts your cost if you want to stay ahead of the pack . . . better get with TUFFALOY; we're coming up with the new ideas in our field.

Write or call your nearest AIRCO or TUFFALOY distributor for more information about these holders. Also request the new TUFFALOY Catalog; it describes the new RW Taper numbering system for spot welding electrodes.

AIRCO

AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated
150 East 42nd Street, New York 17, N. Y.

More than 700 Authorized Airco Distributors Coast to Coast

On the west coast: Air Reduction Pacific Company, **Internationally:** Airco Company International, **In Canada:** Air Reduction Canada Limited
ALL ARE DIVISIONS OR SUBSIDIARIES OF AIR REDUCTION COMPANY, INC.

For more facts Circle No. 202 on Welding Info-Aid Card

Now You Can Weld or Cut with a HELIARC "Tig-Twin" Kit...

When you own one of the new LINDE Heliarc "Tig-Twin" Kits, you're ready to take on almost any inert-gas-shielded arc welding or cutting job!

Use the lightweight torch for Heliarc welding. It's the fast, convenient method of joining ferrous and non-ferrous metals without flux. Then use the same torch to cut light-gage metals—without additional attachments.

Heliarc "Tig-Twin" Kits contain standard, high-quality LINDE components. They're designed to perform economically through years of trouble-free service. And the price is right. Talk to your nearby LINDE distributor now. Or write for his address to Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

LINDE COMPANY

UNION CARBIDE

LINDE, HELIARC and UNION CARBIDE are registered trade-marks of Union Carbide Corporation.

John B. Dempsey has been transferred to Aurora as manager of electric and automotive tool sales for Thor Power Tool Co., Aurora, Ill. Thor has also transferred **Octo Schellenberger** to Aurora as division manager of industrial sales. **A. V. Moroz** has been named Farm and Ranch Div. sales manager for Thor. **Clarence B. Bergren** has been transferred to Tynemouth, England, as managing director of Thor Tools, Ltd. and **Samuel P. Gartland** has been transferred to Turin, Italy, as managing director of FIAP, a newly acquired subsidiary of Thor.

Air Reduction Sales Co., New York City, has appointed **S. S. Bruce, Jr.**, as manager of the national railroad sales department in Pittsburgh, Pa.

Bruce

Thurston

John F. Thurston, vice president for special projects of General Dynamics Corp., Chicago, has been named senior vice president of the firm and president of the Liquid Carbonic Div., Chicago.

George E. Borst and **Edward S. Fraser** have been elected directors of Chicago Bridge & Iron Co., Chicago. They succed **H. C. Brown** and **Donald A. Leach** who have retired.

In changes at General Electric Co.'s X-ray Dept., Milwaukee, Dr. **W. F. Loranger** has been named manager of chemical process sales and **D. F. Raymond** has been put in charge of all X-ray department sales to the federal government. In addition **H. W. Pickett** has been put in charge of instrument and sensor system sales and **S. T. Workman** is now responsible for radiation generator, image presentation system, and X-ray supply sales.

No other tool saves you so much money in so short a time!

Arcair process for metal removal

The Arcair Torch moves metal. Faster, better, cheaper than any other tool or process. Cuts, gouges, bevels any metal. Under almost any conditions.

ARCAIR PROCESS—The Arcair Torch uses current from your welding machine and special electrodes to melt metal. Ordinary shop air through the Arcair Torch blows away the molten metal. Job is finished, amazingly fast, clean.

SAVES MONEY—The Arcair Process moves metal four, eight, ten times faster. Saves minutes, hours. Eliminates costly finishing equipment. Your men learn to operate the Arcair Torch in 15 minutes. Complete range of hand and automatic torches. There's one that will save you money.

NEED PROOF?—Write us your specific problem. We'll show you how the Arcair Process can save *you* money—fast.

Arcair®

Bremerton, Washington
Lancaster, Ohio
Circle No. 203 on Welding Info-Aid Card

Robert T. Everett has been appointed manager of Selenium Process for Vickers, Inc., Electric Products Div., St. Louis, Mo. Everett had previously been associated with Syntron Co. as supervising engineer.

American Society for Metals, Metals Park, Ohio, has appointed **William J. Hilty** exposition manager in the communications department and **Marjorie R. Hyslop** manager of Metals Documentation Service.

Edward M. Stuart, a veteran of over 41 years with The Black and Decker Mfg. Co., Towson, Md., has retired. **Peter B. Wayman** will succeed Stuart as Miami district manager of the firm's industrial-automotive division.

Picker X-Ray Corp., White Plains, N.Y., has promoted **Frank C. Guise** to industrial sales manager of the New York Metropolitan area. Guise was manager of accessory sales.

Ernest E. Randle has been named Los Angeles district sales manager of the industrial-automotive divsion of The Black and Decker Mfg. Co., Towson, Md.

The American Hot Dip Galvanizers Association, Washington, D.C., has elected **W. M. Boyles** as 1961 president. Boyles is president of the Boyles Galvanizing and Plating Co., Hurst, Texas. The American Hot Dip Galvanizers Association, has also awarded the 1961 Thomas M. Gregory Award to **Robert E. Byrd** who is associated with Atlantic Steel Co., Atlanta, Ga.

Joseph N. Kuzmick, divisional manager of Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N.J., was elected vice president of the corporation. He has been with Manhattan for 42 years.

Charles J. Hunter has been promoted to chief metallurgical engineer of steel operations for United States Steel Corp. Hunter will headquarter in Pittsburgh. **William E. Haskell** succeeds Hunter as general superintendent of U.S. Steel's South Works in Chicago.

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Time is money, and your LINDE distributor is the man to save you a lot of both. He maintains complete stocks of equipment. They're top in quality—the LINDE brand name is your assurance of that. Whether it's for welding and cutting apparatus, industrial gases, welding rods, supplies, or accessories—you can count on your LINDE distributor to deliver what you want *fast.*

What's more, he can back up this service with sound, knowledgeable advice on welding and cutting. He's a welding supply specialist, an independent local businessman—*it's his business to know your business.* And for extraordinary problems, he can draw on LINDE's exceptional technological services which have been built on more than 50 years of pioneering in welding.

A phone call from you is all it takes to enlist his services. Look up your LINDE distributor in the classified directory, or write for his address to Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada,* Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

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"Where One Call Gets It All"

LINDE COMPANY UNION CARBIDE

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Small, portable, high-powered FEDREX units are the most flexible and useful X-Ray equipment ever offered. Their high ma output, long duty cycle and rugged construction are unequalled. Available in 140, 160, 200 and 260 KV units. (160 and 200 KV 360° models also available.) Stepless independent KV and milliampere adjustments over wide ranges permit exact exposure setting without guesswork. Built-in synchronous timer and exposure charts simplify setups and assure accurate results.

Shielding in the X-Ray head reduces stray radiation from all models to 5mr/hr or less at 10 feet. Automatic shut-off controls provide complete overload and flashover protection.

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Manufacturers Representatives Solicited. Electronics and Automatic Systems engineers interested in career positions, send detailed resume to P.O. Box 110, Princeton, N. J.

No Other Product Can Do a Galvanizing Job Like

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Does - HERE'S PROOF

Heat welded seam on galvanized sheet to 600° with Torch

Rub GALVALLOY against heated surface as shown — now spread with wire brush for a bright finish.

GALVALLOY Covers the Same Amount of Area with 1/5 the Amount of Material.

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MANUAL ARC WELDING

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GROUND ATTACHMENTS

Buy from your local

WELDING SUPPLY HOUSE

LENCO, INC.

350 W. ADAMS ST., JACKSON, MO.

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David H. Baker has been elected vice president of Vickers, Inc., Detroit, and its International Div. Baker has been president of Capital Airlines, Inc., since 1957.

Miller Electric Mfg. Co., Appleton, Wis., has promoted **John R. Dwyer** to assistant to **C. Burnell Abel,** vice president in charge of sales. Dwyer has been with Miller Electric since 1956.

Dwyer

Clarke

Walter R. Clarke has been appointed to the newly created position of product manager in the marketing division of Square D Co., Park Ridge, Ill.

Omark Industries, Inc., Portland, Ore., has named **Edward P. Skralskis** executive vice president in charge of all United States operations, and **Harold G. Cutright** has been appointed vice president of marketing.

Manager of the new product planning department of Graver Tank & Mfg. Co., Chicago, is **Joseph J. Finnegan.**

Dr. **Robert W. Van Houten,** president of the Newark College of Engineering, has been elected president of the American Society for Engineering Education. Dr. **George A. Marston** and Dr. **Curtis L. Wilson** were elected vice presidents and **Wendel W. Burton,** of the Minnesota Mining and Mfg. Co., was re-elected treasurer.

Died . . .

Ernest Edgar Thum, 76, director of editorial services of the American Society for Metals died April 10 in Coronada Beach, Calif. Mr. Thum was editor-in-chief of *Metal Progress,* the Society's monthly magazine. He is survived by his wife, two sons and two daughters.

In retrospect

(Taken from **Welding Engineer** issues of June, 1916, 1931 and 1946)

—45 Years Ago—

A great deal is being said these days about industrial preparedness. . . . It means nothing more than efficiency in one's business. Make the goods a little better and a little cheaper, and market them more scientifically.

The firm of Campbell & Rickel, Minneapolis, will in the future be known as the United States Welding Co. The firm will manufacture its own goods under the trade mark "U. S." Officers of the company remain the same.

—30 Years Ago—

Dr. Ancel St. John, President of St. John X-Ray Service Corp., New York City, has been appointed a member of the technical board of Welding Engineering & Research Corp., also of New York City.

The Modern Engineering Co. of Memphis, Tenn., has just completed a new acetylene plant. Except for the compressor, all equipment was built by the Modern Engineering Co. of St. Louis.

—15 Years Ago—

Bent Laune, Dick Mandel and Tom Nast have formed their own firm, All-State Welding Supply Co., with headquarters at 96 W. Post Rd, White Plains, N. Y. Laune is president, Mandel vice president and Nast secretary-treasurer. Regional offices are located in Chicago and Los Angeles. The firm will supply a complete line of brazing alloys and fluxes.

L. O. Schneiderwind, Omaha, was elected first president of the National Welding Supply Association at the organization's second annual convention held in Dayton, Ohio. Other officers named were Ralph Chase, Benton, Ill., senior vice president, and H. G. Weiler, Dayton, secretary-treasurer. Members approved a constitutional change whereby manufacturers are now eligible for membership.

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"COPY NIBBLERS"
mass produce any shape
...Copy directly from your master

Quickly—
Easily—
Economically
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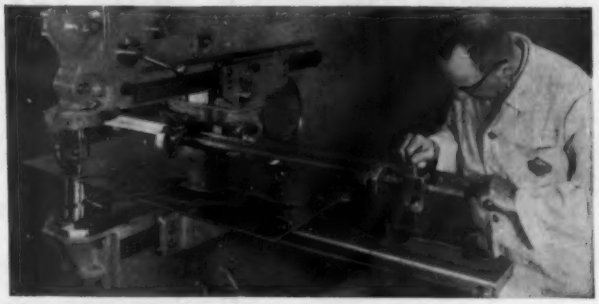
- Folding
- Shearing
- Slotting
- Flanging
- Louver Cutting



Eliminate high tooling costs:
Sheetmetal is firmly clamped and guided by roller-bearing coordinates as operator effortlessly feeds tracer along template contours. Built-in rulers quickly position sheet for rectangular cuts. Circular cuts to 24" diameter are made through a special swivel ruler.

All-side-cutting punch pierces its own starting hole—cuts in any direction without distortion. Copy nibbles up to 9 gage steel—regular nibbling up to 0.20" steel—shears up to ¼" steel.

Steplessly adjustable stroke and stroke position. Three models—throat depths 41", 49" and 59". Universal forming attachments available.

Demonstrations arranged with Factory Specialists.

COSA
Importers of Leading Precision Machine Tools
Nationwide Sales and Service
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

IT'S NEW: IT'S HANDY
IT'S ECONOMICAL

NEW "ROYAL" HARDENING POWDER IN THE NEW SHAKER CAN

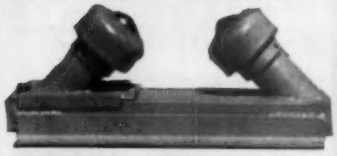
- "ROYAL" Hardening Powder is more effective than cyanide. Gives off no dangerous fumes. Simplifies the work. Economical to use.
- Makes low-grade steel perform like high-grade steel.
- Enables the weldor or blacksmith to produce a finer cutting tool without technical equipment.
- Produces a .01 to .02 in. case depth with necessary Brinnell toughness on large and small low-carbon steel tools and parts.
- Send for sample and descriptive booklet.

Manufactured only by:
ANTI-BORAX COMPOUND CO., INC.
Fort Wayne 9 Indiana

Circle No. 208 on Welding Info-Aid Card

ANYWAY YOU LOOK AT IT, IT'S OXO

ADJUSTABLE PIPE DOLLIES



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Heavy duty ball-bearing design enables weldors to both rotate and move pipe longitudinally.
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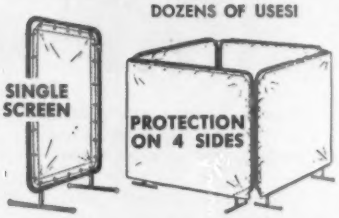

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Describes screens in detail. Complete line of work gloves, welding gloves and safety clothing.

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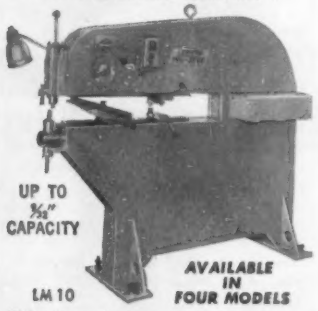

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Book reviews...

Brittle fracture

SELECTED REFERENCES ON BRITTLE FRACTURES. Published by Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., 1960, 65 pages. Price 50¢.

The results of past and current studies in brittle fracture are listed and cross-referenced by 14 subject categories in this bibliography.

The categories include testing techniques, low-temperature fracture, welded structure fracture, temper brittleness, stress-corrosion cracking, fracture of nonferrous materials, methods of circumventing brittle fracture.

The booklet points out that brittle fracture is a current problem in rocket motor case fabrication, and in the past has caused failures in gas pipelines and welded ships.

Industrial radiology

BIBLIOGRAPHY ON INDUSTRIAL RADIOLOGY — VOL. 8, 1958-1960 — REFERENCES 5212 TO 5905. Published by St. John X-Ray Laboratory, Califon, N. J. By Herbert R. Isenburger. Price $4.

This volume includes pertinent references from the last September conference on the use of radioisotopes in the physical sciences and industry can be found. References are 5842 to 5866.

The author attended the conference sponsored by the International Atomic Energy Agency in Copenhagen.

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ALLEN FLUXES
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BLOWTORCHES

Here are rugged, high efficiency blowtorches that speed up all types of heat treating and production operations. These two Clements Cadillac Blowtorches provide heat up to 2200°F., in seconds and are fully portable.

With the Clements Cadillac model K3 or M2 you can bring the torch to the work instead of the work to the torch as in fixed installations. Furnished fully equipped with 20 ft. of Underwriters' Laboratories and Canadian Standards Association approved 3-wire cable with plug, 10 ft. of gas hose with fittings ready to attach to your gas line and with sturdy, high stability stand. Easily adjustable for height and direction of torch.

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A Management position that offers a challenging responsibility for the individual interested in a western location. Send complete resume and requirements to: Box No. 619, c/o Welding Engineer, 5826 Dempster St., Morton Grove, Ill.

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For midwest manufacturer of production fusion welding machines. Must have experience in mass production techniques and automatic welding process applications. Ability to visualize methods of process mechanization, and to prepare quotations, specifications, and negotiations with customer through sales representatives is required. Age 30-35. Only applicants possessing these qualifications will be considered. Submit resume for confidential handling to:

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Box 611 Danville, Illinois

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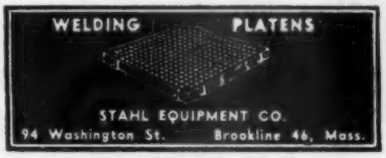

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A.C.-D.C. 3/60/220/440, and 25 cycle and D.C.-D.C. Lincoln, Westinghouse, G. E., on running gear, F.O.B. Pittsburgh & Phila. $125.00 to $150.00 each.

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MANUFACTURERS - CONTRACTORS. Eliminate high training costs. Hire all position combination Welders ready for certification. MODERNWELD TRAINING & PLACEMENT, 1740 Broadway, Schenectady, N. Y.

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40 meter, up to 1600 cu. ft. per hour Factory rebuilt column as new. Liquid pump new; guaranteed. $20,000 net f.o.b. Detroit. Total value with electrical equipment $45,000.

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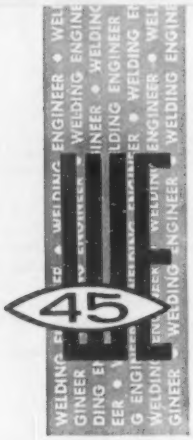

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LITERATURE for your library

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Circle No. 76 on Info-Aid Card.

NONDESTRUCTIVE TESTING EQUIPMENT — Princeton Div., Curtiss-Wright Corp. Illustrated 2-color folder (CS 100-000) is 6-page brochure of products for nondestructive testing including ultrasonic testing, radiography, and fluorescent penetrants.
Circle No. 77 on Info-Aid Card.

METALS CATALOG — Whitehead Metals, Inc. Sixteen-page catalog (40M-2-61) includes listing of nickel, monel, inconel, and incoloy in sheet, rod, pipe, tube wire.
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STUD WELDING UNITS — KSM Products, Inc. Four-page 2-color folder (16110) illustrates and describes stud welding units with features and unit specifications.
Circle No. 79 on Info-Aid Card.

GAS-CUTTING MACHINES — Messer Cutting Machines, Inc. Sixteen-page illustrated article describes modern heavy-duty gas-cutting machines.
Circle No. 80 on Info-Aid Card.

VACUUM DRY BOX — Controlled Atmosphere Enclosures Mfg. Co., Inc. Bulletin No. 35 is sheet illustrating and describing stainless steel dry box for high vacuum use.
Circle No. 81 on Info-Aid Card.

AUTO CRANES — Auto Crane Co. Illustrated 6-page booklet with price list tells how to eliminate muscle strain when loading heavy equipment through use of hoisting equipment.
Circle No. 82 on Info-Aid Card.

INDUSTRIAL REGULATOR — Modern Engineering Co. Illustrated literature gives major features of regulator for compressed air and all non-corrosive commercial gases.
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FLASH WELDER — Thomson Electric Welder Co. Four-page illustrated folder (6-2-01) describes flash welder with transformer capacities rated at either 50 or 75 kva at 50% duty cycle.
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FLEXIBLE PIGTAILS — The Bastian-Blessing Co. Catalog pages GE2A and 2B describe stainless steel teflon flexible pigtail for cylinder charging under extreme stress of connecting and disconnecting.
Circle No. 85 on Info-Aid Card.

SILICON RECTIFIERS — Semiconductor Div. of Syntron Co. Bulletin No. 300 in color gives electrical and mechanical specifications of silicon rectifiers and stacks.
Circle No. 86 on Info-Aid Card.

METALS SELECTION — American Society for Metals. Thirty-two page illustrated brochure describes new handbook on properties and selection of metals complete with examples from the handbook.
Circle No. 87 on Info-Aid Card.

WELDING ALUMINUM — The Aluminum Development Association. Addendum 2 to Bulletin 19 in 8 pages, gives guidance in choice of welding processes and helps to select filler or electrode for welding aluminum.
Circle No. 88 on Info-Aid Card.

PROTECTIVE HEAT CLOTH — Frommelt Industries. Illustrated sheet (No. R. F. 100) gives various uses of protective heat cloth including screens, curtains, clothing.
Circle No. 89 on Info-Aid Card.

IGNITION EXCITATION CIRCUITS — General Electric Co. Bulletin PT-50, 16 pages, contains detailed information on ignitron excitation circuits.
Circle No. 90 on Info-Aid Card.

CLAMPS — The Cincinnati Tool Co. Twenty-four-page illustrated booklet (Catalog 119) describes full line of clamps with specifications.
Circle No. 91 on Info-Aid Card.

PIPE WELDING — Smith Welding Equipment Corp. Illustrated sheet (PWCP 10M 1-61) gives features of combination welding-cutting-heating outfit for pipe weldors.
Circle No. 92 on Info-Aid Card.

WELDING ACCESSORIES — Jackson Products. Sixteen-page catalog describes welding accessories and safety equipment including electrode holders, ground clamps, cable connectors and face protection devices.
Circle No. 93 on Info-Aid Card.

WELDING CLOTHING — Elliott Glove Co., Eight-page 2-color illustrated catalog tells advantages, lists sizes of coats, bibs, sleeves, leggings, aprons, and gloves for welding.
Circle No. 94 on Info-Aid Card.

ELECTRONIC WEATHER CONTROL — Heat-Timer Corp. Illustrated 2-color 4-page booklet (A.I.A. File No. 30-E-1) tells how electronic weather control eliminates waste due to overheating.
Circle No. 95 on Info-Aid Card.

FLAW LOCATION — Turco Products, Inc. Illustrated 4-page booklet (A-500F) is an article on how to perform dye penetrant inspections for flaw location.
Circle No. 96 on Info-Aid Card.

COMPRESSED AIR FILTERING — Wilkerson Corp. Circular 1040 is 8-page catalog illustrating complete line of filters for converting regular compressed air to pure air usable for operating pneumatic precision instruments.
Circle No. 97 on Info-Aid Card.

SOLDERING, BRAZING — L. B. Allen Co. Form 55 is illustrated sheet giving schedule of prices for brazing, soldering and welding products.
Circle No. 98 on Info-Aid Card.

POWER SUPPLIES — Glenn Pacific Power Supply Corp. Illustrated 2-color sheet (Form BW400-1) lists specifications and features of power supplies for Tig welding.
Circle No. 99 on Info-Aid Card.

HAND RAIL BENDING — Hossfeld Mfg. Co. Illustrated sheet gives set up instructions for bending hand rail capping on special bending attachment.
Circle No. 100 on Info-Aid Card.

WELDING GLOVES — Advance Glove Mfg. Co. Work Glove Catalog No. 360 illustrates and gives data and prices on wide variety of work gloves.
Circle No. 101 on Info-Aid Card.

RESISTANCE WELDERS — The Federal Machine and Welder Co. Eight-page illustrated brochure 1-60 contains suggestions and information on correct operation and maintenace of firm's resistance welders.
Circle No. 102 on Info-Aid Card.

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176. Alloy Rods Co.—Data sheet available on "Atom-Arc" "T" gives detailed application information.

177. All-State Welding Alloys Co., Inc. —"All-State Instruction Manual and Catalog" is available, explaining joining problems.

150. American Platinum & Silver Div. —Booklet available, "A Complete Guide to Selective Fluxing For Low Temperature Silver Brazing."

208. Anti-Borax Compound Co., Inc.— Descriptive booklet and sample of the new "Royal" hardening powder is avail able.

173. Auto Crane Co.—Illustrated liter ature, specifications and price lists o all models of Auto Crane available.

167. The Bastian-Blessing Co.—Catalo No. G300-GA available on "RegO" s ries acetylene cylinder valve.

Make a habit of folding out the INFO-AID cards as you begin to read each issue of WELDING ENGINEER so that you can easily circle the appropriate numbers.

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154. Bernard Welding Equipment Co.—"The use of Water Cooling for Welding Equipment" will fully explain the use and methods of water cooling for all types of welding equipment.

199. Columbia Electric Mfg. Co.—Catalog WE-400 is available on the Tong-Test Ammeter to get the exact amperage for your welding job.

163. Cam-Lok Div.—Catalog available on plugs, connectors and receptacles manufactured by Cam-Lok.

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200. Dockson Corp.—Complete welding and cutting equipment catalog available on Dockson torches.

182. The Fibre-Metal Products Co.—Bulletin No. 73 gives complete helmet and accessory information.

152. Hobart Brothers Co.—Circle No. 152 on the Welding Info-Aid card for a sample of 447-A electrode for mild steel welding.

166. Markal Co.—Literature on "Thermomelt" available and sample pellets.

171. Metco Inc.—Bulletin on hardfacing with "ThermoSpray" is available from Metco.

164. National Cylinder Gas, Div. of Chemetron Corp.—Bulletin NH-142-E-2-F available, giving further information on the NCG AM-7 Gun for MIG welding.

187. N R C Equipment Corp.—Data sheet, specifications and prices on NRC's Electron Beam Vacuum welding equipment is available.

209. Oxo Welding Equipment Co. — Catalog available on adjustable pipe dollies.

194. Phoenix Products Co. — Folder available, "Dry Rod as Standard Welding Equipment" further explains electrode ovens manufactured by Phoenix Products Co.

210. Singer Glove Mfg. Co.—Write for catalog describing screens in detail, also welding gloves and safety clothing.

168. A. O. Smith Corp.—A sample of the W610 electrode is available to test in your shop.

178. Smith Welding Equipment Corp. —Wall charts showing flame traits of oxy-acetylene and oxy-LP gas in cutting, welding and brazing is available.

160. Stulz-Sickles Co.—Write for price bulletins on Stulz welding electrod and name of your nearest distributor.

202. Tuffaloy, Air Reduction Sales Co. —Tuffaloy catalog available describing the new RW Taper numbering system for spot welding electrodes.

153. Victor Equipment Co. — Bulletin RV-2 gives flow ranges for all gases used with the Victor regulators and Victrometers.

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MODEL DAH-350-L FIREBALL is a five-in-one combination a-c/d-c welder for metallic arc or tungsten inert gas welding. This unit offers a 10 KW, 115-230 volt single phase, 60 cycle power plant plus 1 KW of 115 volt d-c auxiliary power while welding. Features three separate current ranges both a-c and d-c, with a minimum of 35 amperes and a maximum of 375 for tungsten inert gas; a minimum of 35 and a maximum of 400 amperes for metallic arc welding.

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